The IRON AGE

Vol. 160, No. 1 July 3, 1947

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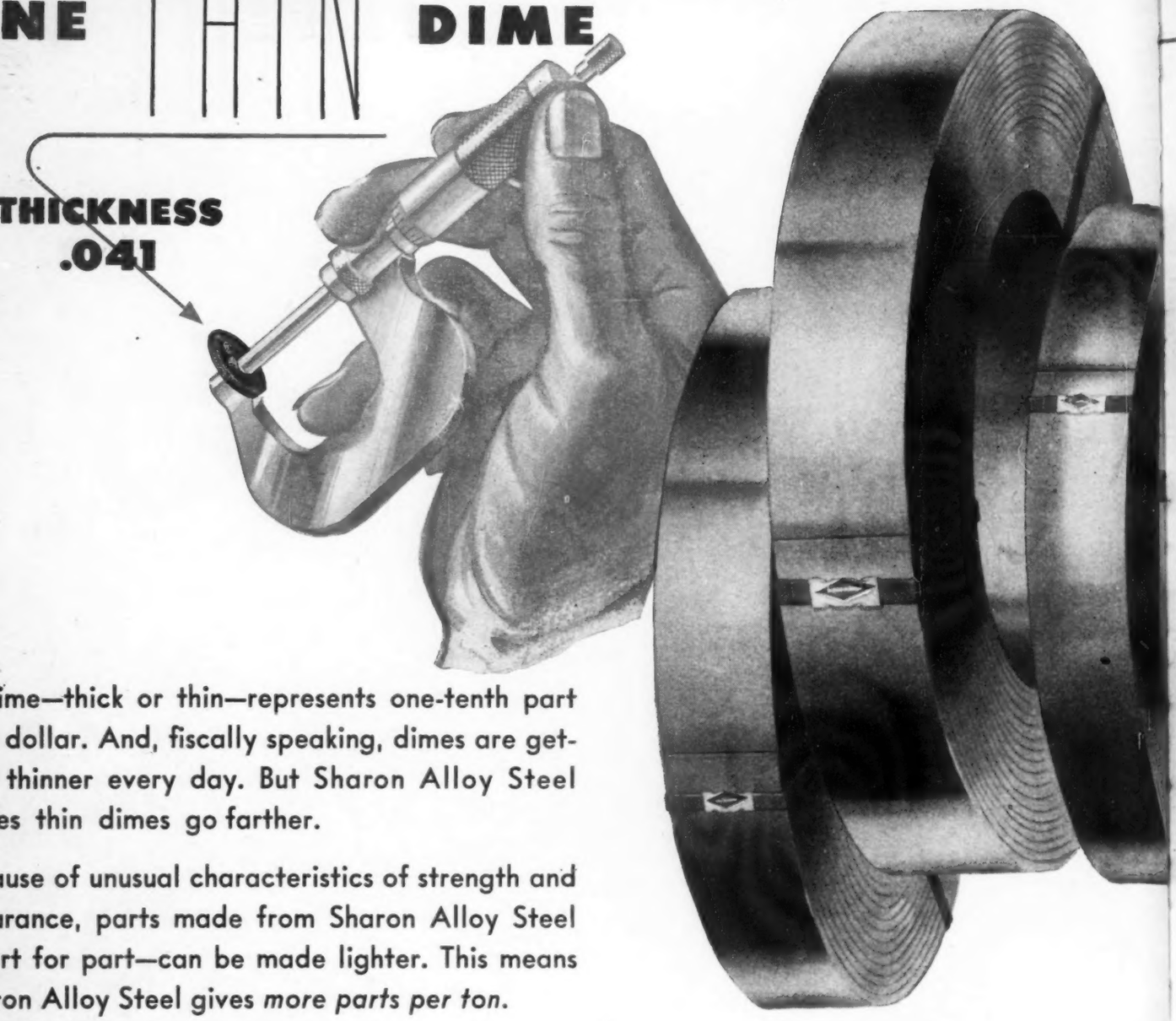
ONE THIN DIME



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July 3, 1947

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Fiscal Sleight-of-Hand

BEFORE year's end Congress will likely shelve for a few days the more earthy problems posed by Mr. Molotov, the atom bomb and Mr. Lewis in order to consider a tricky maneuver in the murky never-never land of high finance. Some rather formidable pressures have built up to warrant a much higher dollar peg for gold purchases. Thereby the Treasury balance sheet overnight will show a tidy paper profit—perhaps as much as $20 billion; South Africa and Australia will get a terrific shot in the arm, well over $1 billion annually; and a delicious shiver of new life will surge through the domestic gold mining industry.

But for the average citizen, life will fumble along in about its usual state of hypertension. A few of the more curious, however, may derive some academic stimulation in calculating in concrete terms their individual inflationary shellacking—and a few of the more thoughtful may be bemused by the demonstration of how wars are inevitably paid for by the cruel unfairness of inflation when there is widespread unwillingness to pay the martial fiddler through direct taxation.

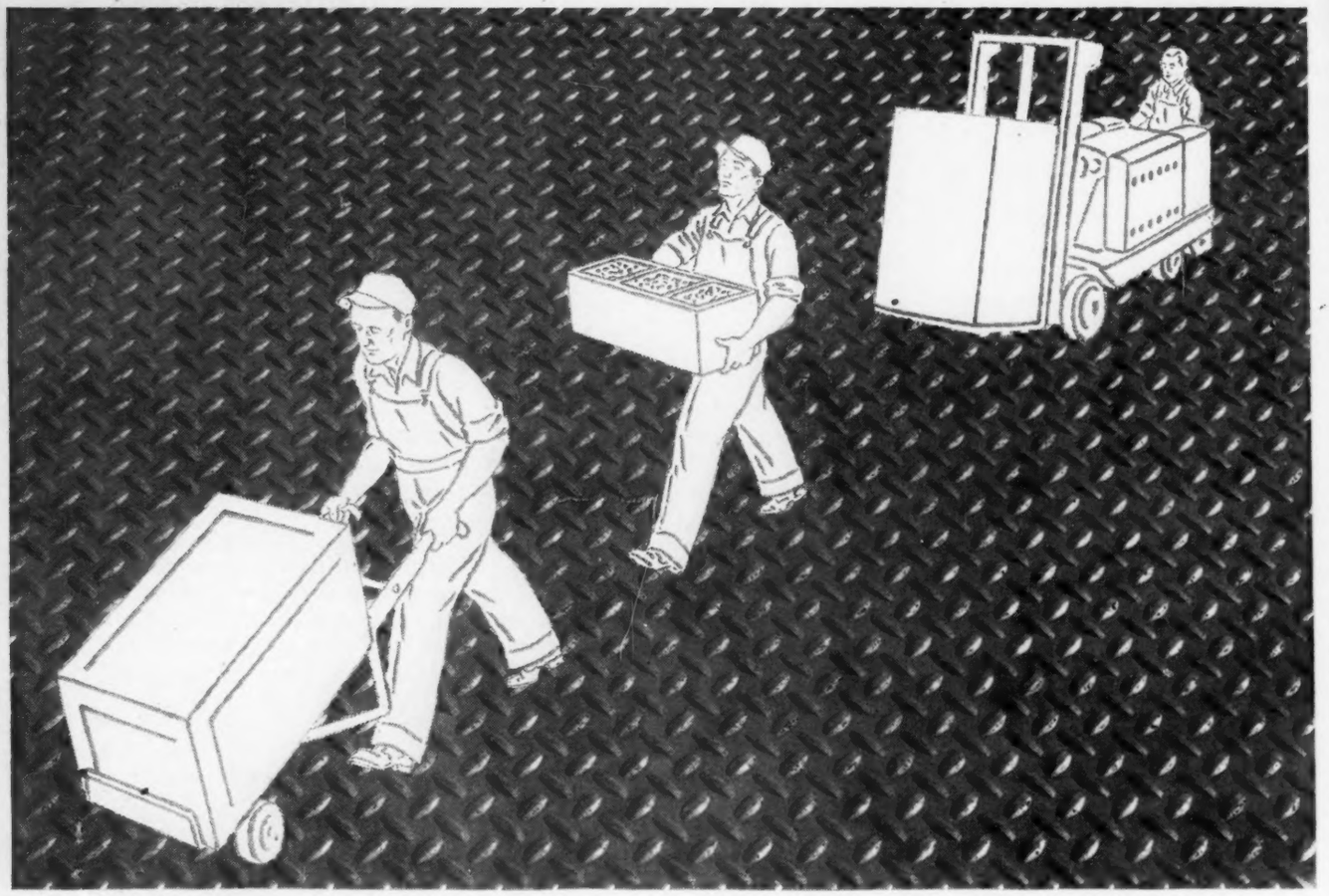
By legislative fiat the word "dollar" has been defined to mean 13.17 grains of gold, about $35 per oz fine, ever since 1934. This has been the one constant in a highly mutable world—because Congress so orders it. But the "dollar" itself has been a rather unstable piece of paper these past few years, what with a terrific multiplication during the war years by means of bank absorption and subsequent monetization (equivalent to printing-press money) of government bonds. This multiplication is reflected in those scattered market places where gold is taken as a measuring stick of value. The gold price in India equals about $82 per oz fine, having been $90 earlier in the year; in Egypt, $65-$70, after having been $87; in Palestine about $86, after having been $100 in January; in Mexico and Brazil the price has been ranging above $40 per oz fine.

In England the London *Times* is pressing for revaluation of the dollar price of gold, to a probable $70-$75 level. This concern is understandable—such action would immediately enable South Africa and Australia to sell their newly-mined gold in the United States for twice as many "dollars" worth of machinery, consumer goods and food, thus bolstering and strengthening the entire British Commonwealth.

Of course, the magic yellow metal—heavy to the hand and velvet to the touch, the search for which has peopled California and Alaska, the Rand in Africa and the frontiers of Australia—has value in the world market places only because of the certainty of redemption in "dollars" worth of American real goods. This certainty of redemption has in the past reflected the American desire for export volume along with a pathological distaste for compensating imports of real goods. The gap has conventionally been closed by government purchase of gold—a form of government export subsidy—the result being the accumulation of two-thirds of the world's monetary gold and the wrecking of the world's monetary systems. This bit of economic blindness has always been good for a cynical laugh—usually by those who most benefit from the practice—that gold should be dug up at heavy cost in Africa, and elsewhere, and shipped to the United States, only to go underground again at Fort Knox.

At this late date, with the world so in need of American goods, there is little likelihood of any change in this particular bit of economic emasculation. It is probably better to get at least some gold in payment for world reconstruction, in place of the usual paper I.O.U.'s. Disturbing factors, however, are the tremendous gold stocks that have been accumulated in Russia, and the reluctance to release any of this gold for foreign purchases. Here again, Russia is playing it smart, waiting for revaluation in terms of dollars.

T. W. Lippert



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► Most Midwest steel producers who tried to keep running during the last coal strike are planning to go down immediately if the miners stay out after their vacation period. Short coal supplies are not the only reason; scrap is equally a factor as the producers would like to build up scrap inventories this time without causing runaway prices.

► In the past few weeks a number of plants working on secret Army and Navy contracts have reimposed wartime security restrictions on plant visitors.

► Currently steel mills require openhearth fuel oil containing less than 1 pct sulfur though other industrial consumers can use oil containing 2 or more pct sulfur. In view of critical fuel oil supply, studies are now under way looking toward use of the higher sulfur oils by making minor changes in openhearth nozzles, deflectors or exhausts.

► Statistical control on a ring and shaft assembly machining job at Northrop Aircraft disproves the widely held theory that in order to obtain closer fit between matching parts it is always necessary to reduce tolerances. In fact, after tolerances were increased on this job the result was a 37½ pct closer fit. The answer is distribution curves based on statistical studies.

► One steel producer now running successful tests on oxygen in the openhearth has discovered that its incentive system in this department will have to be sharply revised or the oxygen openhearth labor will wax wealthy and the company will find the process too costly.

► The nationwide battle to balance inventories is causing consumers to gage all stocks by the amount of flat-rolled steel on hand. Some other steel items are now easing; producers of carbon bars, 1½ in. or over, bessemer or openhearth, are now quoting 60-day delivery in many areas.

► Midwestern gasoline station tank makers have for months been unable to get sufficient steel to keep up with demands. The recent entrance of a steel producer into the field of fabricating such tanks is causing a lot of worry among the older fabricators.

► Radioactive tracers are predicted as a new metallurgical tool for investigating phenomena in fabricating and testing operations in both ferrous and nonferrous metals and alloys.

►One third of the American people think business is making too much money; most think profits average 25 pct; and about half do not believe business figures or they distrust them. These are results of a survey made for a unit of the Controllers Institute of America.

► The Russians have recently reported invention or design of three "new" machines: (1) Induction tempering equipment; (2) tensile testing machine with automatic recorder; and (3) high temperature creep testers. No. 1 is believed to be based on Tocco equipment and manuals sent to the USSR via Lend-Lease. No. 2 bears a striking resemblance to a Riehle testing machine equipped with an early Southwark-Emery stress strain recorder. Equipment similar to No. 3 has been in use in American testing laboratories for at least 10 years.

► Belgian "open market" steel representatives now in this country are incensed at certain American "gray market" brokers who are cutting prices, with a recent large export sale of billets at $78 per ton, only $26 a ton above the mill price.

► General Motors is reported to have purchased a Swiss automobile factory at Bienne. The present schedule of 8 cars a day will be stepped up to 14.

► German sources propose to barter 2 million tons of rich Swedish iron ore for 300,000 tons of rolled steel products. German profit on the deal at today's prices would be 1.3 million tons of the ore plus the scrap that would arise. No indication of military government approval has been given.

► European pressure on the order books of American rolling mill manufacturers is increasing. A 350,000-ton mill for the Swedish Norrbotten works has been ordered from Loewy Engineering Co., and the Belgian Ougree Marihaye has ordered a mill from Lewis Foundry & Machine Div. of Blaw-Knox.

Practical Procedures for Reducing

The effective control of porosity resulting from the separation of gases during solidification has long been a serious problem to nonferrous foundrymen. Simple, practical means of reducing such porosity are given in this article in the form of a series of recommended practices covering tin bronzes, the aluminum and silicon bronzes, the yellow brasses and the manganese bronzes. Effects of fuel-fired and electric furnace melting are discussed, and atmosphere control, melting practice, superheating, stirring, deoxidizing and pouring are also covered.

FEW subjects are of greater dollar-and-cents importance to the foundryman than porosity resulting from the separation of gases during solidification. Porosity resulting from metal shrinkage is also a factor in foundry work, but is more widely understood and easily controlled than the true gas porosity, to which this discussion is wholly devoted. Yet, most published material on gas porosity has, so far, been quite technical. This discussion, therefore, will undertake (1) to explain in simple language the mechanism of (and influences upon) porosity arising from gas separation, and (2) to set forth specific recommended practices for melting, handling, and casting the popular copper-base alloys in such a manner that minimum gas porosity results. The recommendations given here are based upon a paper presented at the recent AFA convention by Herman L. Smith, field metallurgist, Federated Metals Div., American Smelting & Refining Co.

For more critical and detailed reference to the phenomena discussed in this article, and for more quantitative research data, see "The Separation of Gases from Molten Metals," by Albert J. Phillips, manager of research, American Smelting & Refining Co., AIME 1947 Institute of Metals Lectures.—Ed.

Mechanics of Gassing

Oxygen, hydrogen, and carbon may be absorbed by molten alloys from the gaseous atmospheres in which they are melted. Thereafter, as the metal cools or changes from the liquid to the solid state, these elements combine to form gaseous compounds which, if in sufficient concentrations, may be ejected from the metal to form porosity in the finished casting.

Nor can it be assumed that small amounts of these elements are unimportant. For example, 0.0001 pct by weight of hydrogen in copper will generate a volume of gas at the solidification point of the copper equivalent to 44 pct of its volume. Further, the small amount of 0.00002 pct of hydrogen is sufficient to start the mechanism of gas separation after 50 pct of the copper has solidified and concentrated the entire hydrogen content in the remaining liquid phase.

Further, the elements, oxygen, hydrogen, and carbon, can coexist in molten metal in different quantities depending on the furnace conditions. A melt may be either high in hydrogen and low in oxygen without their combination and the separation of steam during metal solidification, or it may be low in hydrogen or high in oxygen. In either case, an increase in the concentration of either element may upset the equilibrium conditions and start the formation of gas bubbles.

There is much technical evidence to demonstrate that no furnace atmosphere encountered in everyday foundry practice will ever be sufficiently rich in hydrogen to cause gas trouble from hydrogen alone where copper-base alloys are concerned. The danger occurs when oxygen appears in sufficient concentrations to form steam by combination with the hydrogen. The key to the problem, therefore, lies in the control of oxygen—(1) its desirability when the metal is being melted and it is desired to reduce hydrogen absorption, and (2) its control below specific limits just before pouring, and while the metal is solidifying.

It is also important to realize that there can be no separation of a gaseous phase from liquid or solidifying metal unless there is either a decrease in solubility or a change in equilibrium between constituents.

It is also worth noting that no gas bubbles can separate unless the total pressure of the gases in the melt exceeds atmospheric pressure plus the hydrostatic pressure of the metal head, plus the surface tension factors of the melt. Gas separation can, of course, take place in a mold at less than atmospheric pressure if shrinkage creates an internal vacuum effect in the voids between the crystals.

The most frequent condition causing gas porosity is one of high hydrogen and low oxygen concentrations, because the melt can easily pick up more oxygen between the time it is taken from the furnace, handled, held, poured, and solidified in the mold—and high concentrations of both constituents thereby be developed. Porosity is not likely to develop in a melt that is initially low in hydrogen, because oxygen pick up will not over balance the equilibrium.

Between the two extremes varying degrees of por-

(CONTINUED ON PAGE 48)

Gas Porosity in Nonferrous Castings

By A. E. St. JOHN
Technical Adviser,
Federated Metals Div.,
American Smelting & Refining Co.,
New York

RECOMMENDED PRACTICE FOR TIN BRONZES

• General practice is to melt rapidly under oxidizing conditions, keep the surface clean by skimming, add a small amount of phosphor-copper, and pour. However, this procedure is never assurance against gas porosity. Field experience has amply shown that phosphorus entering the charge through remelt metal, such as gates, risers, runners, borings and such, may cause porosity despite the above practice.

The difficulty stems from the eager combination of phosphorus and oxygen during the melting cycle, thus using up the oxygen which would otherwise act normally to control hydrogen absorption. As a result, dangerously high hydrogen concentrations may occur.

Chemical analyses of many foundry heats have shown that a phosphorus content in tin bronze charges of between 0.001 and 0.05 pct is common. If present in amounts over 0.01 pct, this phosphorus may steal oxygen during melting in sufficient quantities to permit excessive hydrogen solution.

The following seven precautions in tin-bronze practice are suggested:

(1) If the phosphorus content of the charge is known to be high, add an oxidizing flux such as copper oxide, before melting. The amount to use depends on the phosphorus content, according to the following schedule: 0.10 pct P requires 1 lb of copper oxide per 100 lb of melt; 0.05 pct P requires ½ lb of copper oxide per 100 lb of melt; 0.02 pct P requires slightly over 3 oz of copper oxide per 100 lb of melt. If the charge contains less than 0.01 pct P no oxide at all need be added. In this connection, it is interesting to note that the use of rough top ingot is desirable because the film which comprises the roughness is an oxide, the very type of compound it is desirable to add at this point.

(2) Always melt under an oxidizing atmosphere. The foundryman's means of testing is with a piece of cold zinc held by tongs in the flame for 2 or 3 sec. If, on removal, the zinc shows a black carbon deposit the flame is reducing and more air is needed. If the zinc remains clean, the flame is sufficiently oxidizing.

(3) Superheat at least 25° or 50° over pouring temperature and skim the metal clean before removing from furnace.

(4) Skim again after transferring metal to the ladle; then plunge a piece of zinc weighing approximately 4 oz per 100 lb of melt deep into the crucible. This is easily done with a phosphorizer or a pair of tongs coated with bone ash or other refractory material. The zinc will vaporize and flush up through the melt, and will aid in removing residual gases. *Both zinc and tongs should be perfectly dry. The easiest method is by preheating them. Cold metals may contain enough moisture to regas the melt.*

(5) Before deoxidizing, allow the melt to remain quiet for 2 or 3 min and come into equilibrium with the surrounding atmosphere.

(6) Deoxidize by plunging phosphor-copper into the melt using the same precautions against moisture as when flushing with zinc. Enough phosphor-copper should be used to leave a residual amount of about 0.02 pct in the melt before pouring. To accomplish this, about 3 oz per 100 lb of melt are generally required.

(7) Permit the melt to adjust itself to pouring temperatures then pour with lip of the ladle as close as possible to the mold, and in such a manner that the sprue is always filled so that minimum opportunity for air entrapment is offered. This avoids oxygen pick up between ladle and cast.

When melting in an electric arc type of furnace it is doubly important to furnish enough oxygen in the form of air, so that any carbon monoxide (produced by all high-temperature carbon arcs) is immediately oxidized to carbon dioxide. In this connection recent researches have demonstrated that at 3090°F as much as 0.003 pct C is soluble in molten copper and may later combine with oxygen to cause troublesome gas porosity. If, however, there is a sufficient sweep of oxygen across the molten surface to keep all carbon in the form of carbon dioxide, the carbon will not be dissolved. Further, with electric furnace melting, there is less opportunity for the melt to absorb hydrogen than from the atmospheres produced by fuel-firing, and, therefore, less deoxidizing with phosphor-copper is necessary.

RECOMMENDED PRACTICE FOR ALUMINUM AND SILICON BRONZES

• In handling aluminum and silicon bronzes it should be remembered that both aluminum and silicon have high affinities for oxygen, much in the manner of phosphorus in tin bronzes. However, the oxides of silicon and aluminum are solids and act to form surface films. Further, silicon and aluminum are present in the melt in such quantities that they cannot be eliminated if the alloy composition is to remain uniform. Consequently they are always present to steal oxygen before it can combine with hydrogen, and it is difficult to prevent hydrogen absorption with the aluminum and silicon bronzes. The only positive cure is to keep hydrogen away from the melt. The following six precautions in aluminum and silicon bronze practice are suggested:

(1) Always melt under an oxidzing atmosphere. Test with a piece of cold zinc held by tongs in the flame for 2 or 3 sec. If, on removal, the zinc shows a black carbon deposit, the flame is distinctly reducing and more air is needed.

(2) Superheat at least 25° or 50° over pouring temperature and skim the metal clean before removing from furnace. In skimming, be sure to break the surface of the metal lightly.

(3) Transfer the metal to the ladle; then keep the surface of the molten metal broken for a period of 2 or 3 min, not by vigorous rotary stirring of the entire melt, but by gently lowering the stirring bar to the bottom of the melt and raising and lowering it a number of times. This tends to disturb the melt so that the dissolved gases have an opportunity to rise and escape.

(4) During this operation the stirring bar should always descend at a new spot through the surface of the melt. This pierces the surface film of aluminum or silicon oxide, which, otherwise, would prevent the escape of dissolved gases.

(5) In the case of the zinc-bearing silicon bronzes, dry zinc may be plunged to the bottom of the ladle, as with tin bronzes. In the case of the zinc-free silicon bronzes, and all aluminum bronzes, no zinc should be added, and only up-and-down stirring of the melt should be employed.

(6) Permit the melt to adjust itself to pouring temperature; then pour with the lip of the ladle as close as possible to the mold, and in such a manner that the sprue is always filled so that minimum opportunity for air entrapment is offered.

When melting in an electric arc type furnace it is doubly important to furnish enough oxygen in the form of air to keep all carbon in the form of carbon dioxide. Otherwise, carbon absorption will take place. Fortunately, however, with electric furnace melting there is minimum opportunity for hydrogen pick up from moisture resulting from combustion.

(CONTINUED FROM PAGE 46)

osity may occur. For example, it is common to have a case where the hydrogen content of the initial melt is not sufficient to result in gas evolution until more than half of the melt has solidified in the mold and raised the hydrogen content of the remaining liquid metal beyond equilibrium values. Every foundryman has seen practical demonstrations of this, where an apparently satisfactory cast shows normal shrinkage in the risers, and then, suddenly, spewing occurs.

RECOMMENDED PRACTICE FOR YELLOW BRASSES AND MANGANESE BRONZES

• Generally, with these alloys, very little trouble is encountered from hydrogen gassing, because there is so much zinc in the alloy that it is constantly vaporizing and acting much in the manner as an inert gas used for flushing. On the other hand this constant vaporization of zinc steals the oxygen from the atmosphere over the melt and may increase the likelihood of carbon absorption. The only cure is to have enough oxygen present so that the carbon will combine therewith to form insoluble gases which are swept away. Any other steps which will keep carbon away from the metal should also be taken. The following four precautions in yellow brass and manganese bronze practice are suggested:

(1) Always melt under an oxidizing atmosphere. Test with a piece of cold zinc held by tongs in the flame 2 or 3 sec. If, on removal, the zinc shows a black carbon deposit, the flame is distinctly reducing and more air is needed.

(2) Bring the metal up to a flaring temperature and allow it to flare for a few minutes. Skim metal in furnace after flaring is finished.

(3) Transfer the metal to the ladle and keep the surface broken by a light stirring action. Skim the metal again; then add enough zinc to replace that which was lost during the flaring. Under usual foundry conditions a flaring period of from 3 to 5 min will remove approximately 1 pct of zinc. *Remember that any zinc added should be perfectly dry. The easiest method is by preheating it. Cold zinc may contain enough moisture to gas the melt.*

(4) Permit the melt to adjust itself to pouring temperature; then pour with the lip of the ladle as close as possible to the mold, and in such a manner that the sprue is always filled so that minimum opportunity for air entrapment is offered.

In the case of the yellow brasses and manganese bronzes, fuel-fired furnaces are preferred, since the principal danger during the melting of these alloys in electric arc furnaces is carbon absorption, and hydrogen absorption from the combustion products of fuels is constantly being counteracted by the flushing action of zinc vapor.

Controlling Physical Properties By the Interrupted Quench

By H. E. BOYER
Chief Metallurgist
American Bosch Corp.,
Springfield, Mass.

Three variations of interrupted quenching, (1) austempering, (2) martempering, and (3) marquenching, are defined and discussed in this article, with the two latter terms introduced as two distinct processes to supersede the current conception of martempering. The author also indicates methods of varying martempering procedures whereby desired hardness and toughness properties can be predetermined, and illustrates deformation characteristics of marquenching as compared with conventional oil quenching methods. Although the data presented in this article have been obtained primarily from SAE 52100 steel, the principles can be applied to other types of steels with equally desirable results.

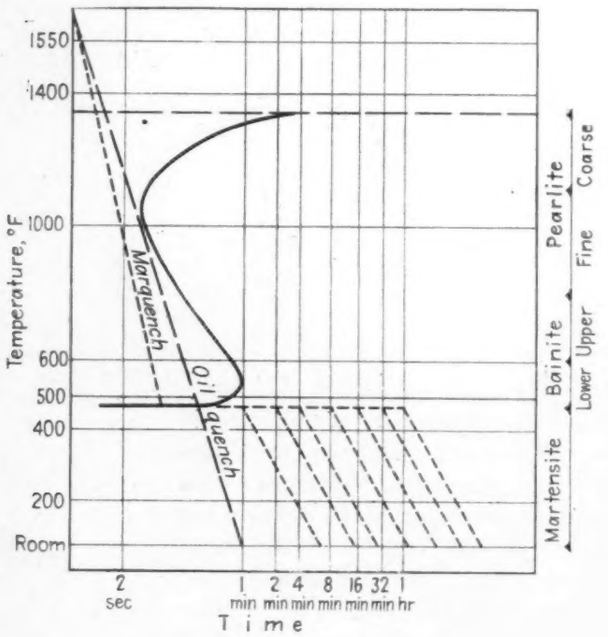
THE use of various forms of interrupted quenching for hardening certain types of steel has been received with increasing enthusiasm in the past several years. To many metallurgists and heat treaters the process is a relatively new one, although it has actually been practiced to some extent for many years, but with a great lack of scientific knowledge and control. The author can recall having seen a blacksmith using an interrupted quench to obtain desirable results in heat treating certain component parts of agricultural machines as far back as 30 years ago. This blacksmith had no scientific knowledge concerning heat treatment, but he had found that high degrees of hardness and toughness could be obtained with a minimum danger of cracking if he quenched the parts from the charcoal forge into water and then transferred to oil at the proper time. In former years such a practice could not be extensively used, for it was necessarily an art and would not be depended upon to consistently produce desirable results, because of insufficiently trained personnel, poor equipment and complete lack of knowledge concerning the mechanics of the transformations taking place in the steels in regard to time and temperature. This situation began to change entirely, after Bain, Davenport and associated investigators first published definite information in the form of "S" curves, which are now better known by the more appropriate title of Time, Temperature, Transformation or TTT curves. These curves placed in the hands of metallurgists and heat treaters a store of information which could be used as a guide not only to produce heat-treated work that consistently possessed the desired microstructures and physical properties, but also provided a better working knowledge, so that the unavoidable variables could be allowed for.

For the benefit of those readers who are not entirely familiar with the use of TTT curves, it seems that some of this information should be briefly reviewed.

Fig. 1 is an illustration which incorporates a typical TTT curve for SAE 52100 steel. This curve is incomplete inasmuch as only the beginning transformation curve is shown. When such a steel as SAE 52100, which contained 1.05 pct C, .032 pct Mn and 1.40 pct Cr, with a grain size No. 9 is heated to a temperature of about 1550°F, the carbide dissolves in the matrix forming the structure known as austenite. To dissolve

For basic data regarding martempering presented by its originator, see "Martempering," THE IRON AGE, Jan. 28, 1943, p. 50 and Feb. 4, 1943, p. 45.

all of the carbide in this particular steel at 1550°F, if it could be done at all, would require an extremely long period of time. An increase of temperature (hereafter termed as austenitizing temperature) will cause the carbide solution to proceed rapidly. The author has found that a temperature of 1900° to 1950°F for relatively short time periods will usually result in 100 pct carbide solution in case of SAE 52100. It is not, however, usually desirable in practice to obtain 100 pct carbide solution or even anywhere near such a percentage. It has been found that for the type of steel now



under discussion it is desirable, for most purposes, to dissolve only about 60 pct of the carbide, which can be accomplished in a nominal period of time at 1550°F. For this reason 1550°F has become the most widely used austenitizing temperature for a steel of such a composition. The microstructure, therefore, at the austenitizing temperature, is composed of a mixture of austenite and undissolved carbide. When cooling from this temperature, the undissolved carbide remains unchanged, but the austenite undergoes a major change, since it is generally unstable at temperatures lower than about 1350°F. As the austenite decomposes new structures are formed. Any structure formed under the temperature of approximately 1350°F will be in the alpha phase, though whether the newly formed structure is pearlite, bainite, martensite or a mixture of these structures is entirely dependent upon the manner and rate in which the cooling takes place. The curve in the left center portion, which resembles the letter "S" in fig. 1, shows clearly how the austenite starts to decompose at the various temperatures as a function of time. The dividing lines between the various structures (shown at the right of fig. 1) are definitely not abrupt, so that they must be considered as approximate.

It may be observed that at just above 1000°F, the austenite begins to decompose within about 3 to 5 sec, forming a very fine pearlite, considerably harder than the coarser pearlite formed at somewhat higher temperatures. If the steel is cooled with sufficient rapidity, so that the 1000°F range is passed without any pearlite being formed, the time of beginnig transformation from the austenite is considerably lengthened. If transformation is allowed to take place at 600° to 800°F, a structure termed as upper bainite is formed, which is quite hard and extremely tough. Start of transformation of SAE 52100 steel under conditions as shown in fig. 1 is the most sluggish at about 550°F. When the steel is allowed to transform isothermally in this temperature range and down to about 475°F, the structure formed is termed as lower bainite, which is still harder, but possesses a lesser degree of toughness than upper bainite. At about 475°F another change

LEFT

FIG. 1—A typical time, temperature, transformation curve for SAE 52100 steel. The curve is incomplete since only the start of transformation curve is shown.

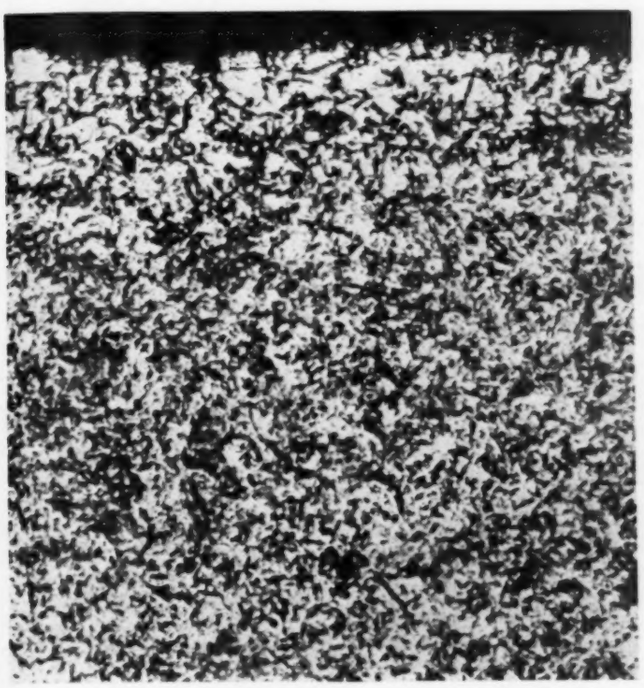
ABOVE

FIG. 2—Photomicrograph of a specimen of SAE 3316 gas carburized at 1650°F for 1½ hr, temperature decreased 1450°F for ½ hr, and quenched in oil to room temperature. The high percentage of retained austenite in the case is very obvious as compared with fig. 3. 500X.

takes place which is shown by the lower end of the "S" curve moving sharply to the left. As to exactly how close this line approaches zero time is not definitely known. This lower end of the "S" curve represents the temperature at which the hard, brittle structure known as martensite starts to form. As in the case of other temperatures at which structural changes begin, this line does not represent an abrupt change, but merely the temperature at which martensite start to form. It has been the experience of the author that

specimens quenched to 25° to 75°F below this line for a period of time sufficient to allow temperature equalization throughout the specimen, showed small percentages of martensite to have formed. As the temperature continues to be lowered from the 475°F range, which is termed as the M_s point, the martensite forms with increasing speed as room temperature is approached.

The M_f temperature, or that at which the martensite formation is complete, is not too definite, although the author has found that for SAE 52100 austenitized at 1550°F, the martensite formation is virtually complete at 212°F. This has been determined by quenching test specimens from the austenitizing temperature first to 475°F, equalizing the temperature with that of the quenching medium and then quenching to other media at lower temperatures, again equalizing the temperature before quickly measuring by means of a magnetic determinator the percentage of transformation which has taken place at these various temperatures. It should be stated that when we speak of a complete transformation from austenite to martensite this is only theoretical, for actually there always remains in the as-quenched structure about 9 to 12 pct of stable austenite.

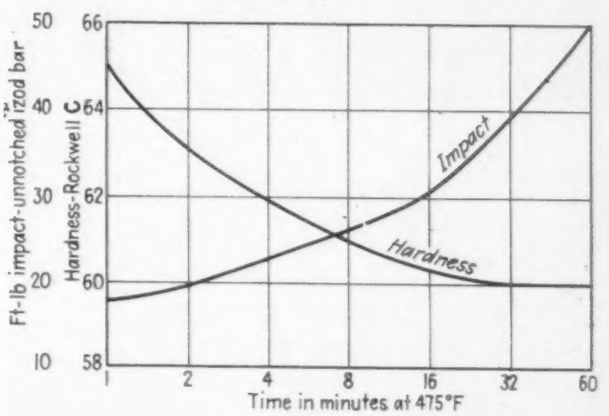


ABOVE

FIG. 3—Photomicrograph of a specimen of SAE 3316 treated as described in fig. 2, except that specimen was quenched from 1450° to 450°F to equalize the temperature and then air cooled to room temperature. The transformation to martensite is obviously far more complete by this method than by the method indicated in fig. 2. 500X.

RIGHT

FIG. 4—Curves indicating effect of holding time at 475°F on impact and hardness properties of SAE 52100 steel. Cycles of treatment are indicated in fig. 1.



As has been stated previously, the "S" curve as shown in fig. 1, holds true for the conditions as shown. The pattern of this curve can be readily changed by variations of composition, change in grain size and variations in austenitizing temperature. The two latter factors are very closely related inasmuch as the grain size increases rapidly as the austenitizing temperature is increased. The actual composition of the austenite, which includes the degree of carbide solution, is actually the major controlling factor and more influential than the original composition of the steel while in the annealed state. As the austenitizing temperature is increased there are several major changes which occur in the "S" curve due to the increased percentage of carbide solution: (1) The whole curve is gradually pushed to the right—that is, the time of beginning transformation at all temperatures is considerably lengthened, and (2) the M_s temperature is lowered rapidly as the austenite becomes more highly enriched in dissolved carbide.

The author has proved by a somewhat elaborate test arrangement that the M_s temperature for the steel being discussed is about 475°F for an austenitizing temperature of 1550°F, but decreases rapidly to about 325°F for an austenitizing temperature of 1700°F. Coupled with the fact that the M_s temperature is lowered, the temperature range of martensite formation is appreciably lengthened to the extent that the M_f temperature may drop much lower than room temperature. The author has done considerable work using the low temperature treatments (down to −120°F) on SAE 52100. It has been found that very small percentages of transformation can be effected by subzero cooling this type of steel even after being austenitized at the normal temperature of 1550°F, though the percentage of transformation at the lower temperatures is much greater when the higher austenitizing temperatures are employed. This proves that an increased per cent of carbide dissolved in the austenite has a marked effect on the location of the M_f temperature. The exact location of M_f points is very difficult to determine —much more so than the M_s point. It may be readily assumed from the above information that if any sort of interrupted quench is employed in the cycle of heat treatment, very close control is absolutely necessary if the desired results are consistently obtained. Obviously the most important factors to keep closely controlled in such a process are austenitizing time and

temperature, which in turn control the degree of carbide solution.

There has been a great deal of misunderstanding relative to the terms that have been applied to the various modifications of interrupted quenching. That is, austempering, martempering and marquenching. It has been generally agreed that austempering consists of quenching from the austenitizing temperature into another medium, which is usually an agitated salt bath held at the temperature range in which bainite is formed. In the case of SAE 52100 steel, this temperature would be about 600°F. This temperature is held for a length of time sufficient to transform the austenite to bainite isothermally. If the quench to the 600°F range has been sufficiently rapid to avoid the formation of any pearlite, the resulting structure will be entirely composed of bainite without ever having formed martensite.

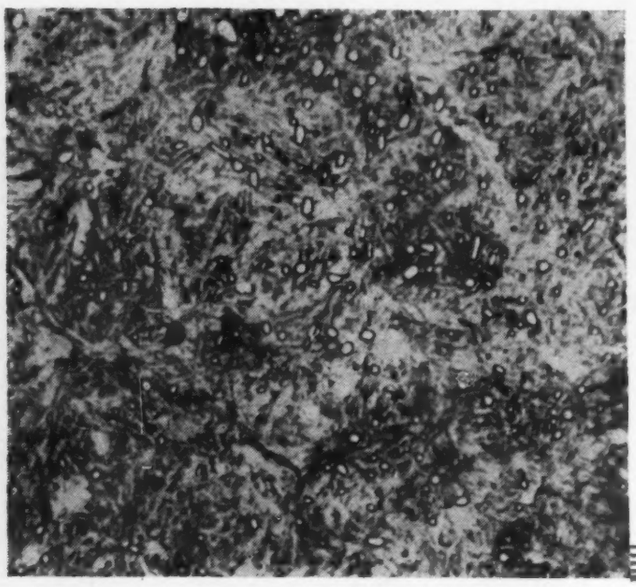
Martempering and marquenching are two terms which have been used somewhat interchangeably, but the author is of the opinion that a definite difference exists between the two terms. Martempering consists of quenching from the austenitizing temperature to the M_s temperature, or very slightly below, and holding this temperature until transformation from the austenite has reached completion. The resulting structure is actually a combination of tempered martensite and lower bainite which has a hardness of 60Rc but is still very tough as compared to a similar specimen composed entirely of martensite. Marquenching is the term which is usually applied to interrupted quench only, without involving isothermal transformation. This is accomplished by quenching from the austenitizing temperature to the M_s temperature, plus or minus a few degrees, and holding just long enough to equalize the temperature through the quenched piece, but not long enough for transformation to begin. The piece is then cooled in air, after which the microstructure will be composed of martensite entirely, excepting of course the small percentage of retained austenite and the undissolved carbide. The resulting hardness of such a piece made of SAE 52100 will be about 65 Rc or the same as would be obtained in a straight oil quench.

The advantages in the use of such a quenching procedure are numerous. First, the equalization of the temperature at the M_s point throughout the section of the work while still in the austenitic condition will contribute a great deal in lessening the total deformation in the finished parts. This is due, of course, to the fact that the formation of martensite is accomplished throughout the sections at a far more uniform rate than in case of parts being quenched directly to room temperature. Another advantage in the use of marquenching practice is the fact that uniform formation of martensite will lessen the amount of unbalanced stresses caused by the volumetric changes which occur during the formation of martensite.

Still another advantage offered by such a quenching practice is the fact that there is a general tendency for the transformation from austenite to martensite to be more nearly complete, leaving a smaller percentage of retained austenite than when quenched in oil from the austenitizing temperature to room temperature (as shown by the line marked "oil quench" in fig. 1). While this difference is not great for SAE 52100 when austenitized in the normal temperature range of about 1550°F, it does become very noticeable in the case of

BELOW

FIG. 5—Microstructure of SAE 52100 steel obtained by quenching from 1550° to 475°F and holding for 1 min. 1000X.



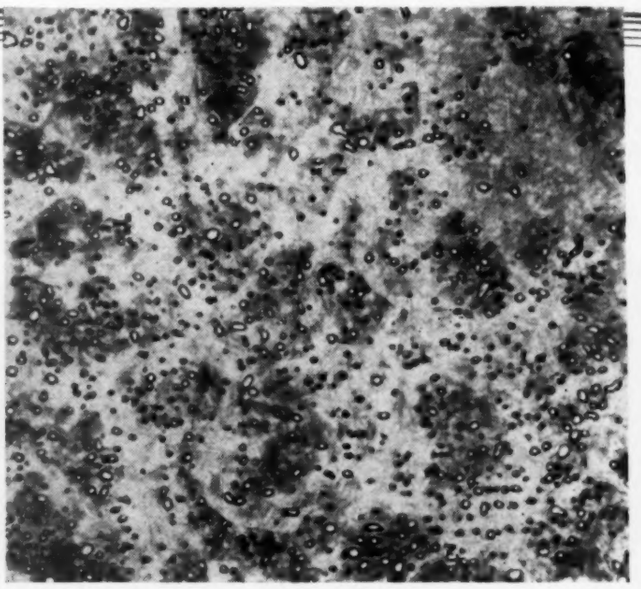


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FIG. 6—Microstructure of SAE 52100 steel obtained by quenching from 1550° to 475°F and holding for 2 min. 1000X.

other alloy steels which have a greater tendency to retain austenite after quench. A typical example of this condition is illustrated by photomicrograph of a specimen of SAE 3316 taken at 500X which was gas carburized at 1650° for 1½ hr, temperature decreased to 1450°F for ½ hr and finally quenched in oil to room temperature. The high percentage of retained austenite in the carburized case, fig. 2, is very obvious. The hardness of this specimen is 57 Rc but drops to the equivalent of 47 Rc when measured superficially. Fig. 3 is a photomicrograph also taken at 500X of a specimen of the same composition and heat treated in identically the same cycle except that it was quenched from temperature. Specimens were then removed at the various time intervals as shown and air cooled to room temperature. The specimen which was held at 475°F for only 1 min was really marquenched rather than martempered, since it was removed from the bath at about the time transformation would have had a chance to begin. The other specimens which were held at 475°F for periods of time ranging from 2 min to 1 hr were transformed isothermally to a degree depending upon the length of holding time at 475°F. Apparently a complete isothermal transformation is obtained in 1 hr or less as shown by physical properties and microscopic studies. Fig. 4 is a chart showing

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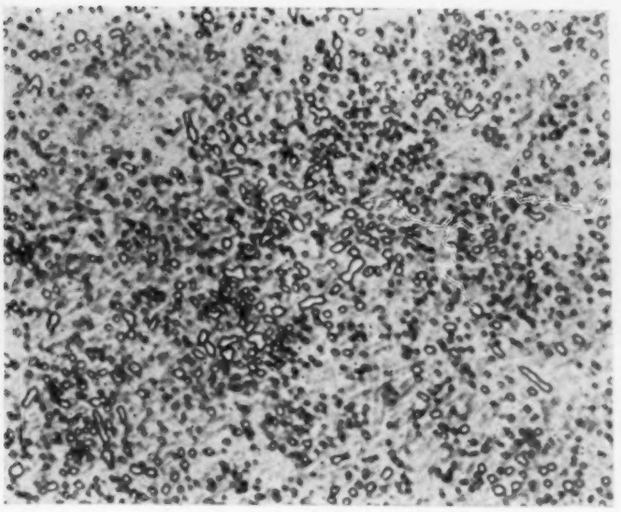
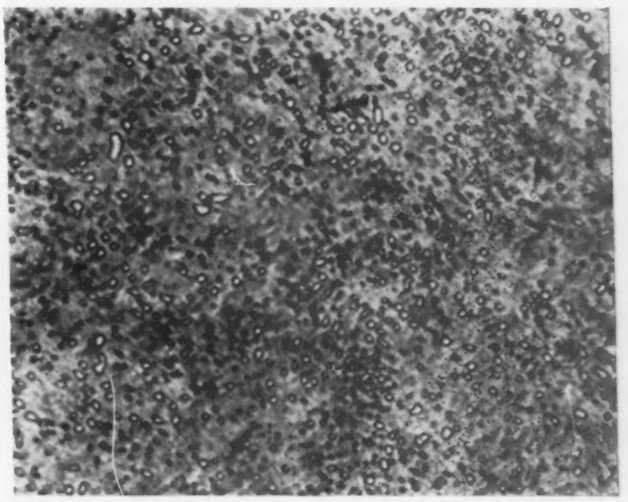
FIG. 7—Microstructure of SAE 52100 steel obtained by quenching from 1550° to 475°F and holding for 16 min. 1000X.





ABOVE

FIG. 8—Microstructure of SAE 52100 steel obtained by quenching from 1550° to 475°F and holding for 1 hr. 1000X.

1450°F to an agitated salt bath held at 450°F for a sufficient length of time to equalize the temperature and then air cooled to room temperature. Hardness of this specimen is 63 Rc and an equivalent superficial reading indicated no soft surface. The transformation to martensite was obviously far more complete by the marquenching method.

Martempering is a variation of the interrupted method of quenching which is becoming more popular and offers considerable possibility in producing parts that show hardness values only slightly lower than those obtained by more conventional quenching methods, and far tougher. By this method the total deformation is held to a minimum. The dotted lines on fig. 1 show graphically how martempering is actually accomplished and how it may be controlled by the length of time in the quenching bath to produce the desired physical properties.

As shown in fig. 1, specimens were quenched from the austenitizing temperature of 1550°F to an agitated salt bath held at 475°F or just about the M_s hardness and impact values obtained from specimens treated as shown in fig. 1. It may be observed that the specimen austenitized at 1550°F and quenched to 475°F for 1 min showed a hardness value of 65 Rc though an impact value of only 18 ft-lb—unnotched special Izod bar 0.435 in. diam. By increasing the holding time at 475°F to 1 hr the hardness gradually decreases to 60 Rc but the impact value rapidly increases to 50 ft-lb (impact curve shows average for many tests).

It may be readily observed that one can, almost at will, accurately control the physical properties by selecting the proper holding time at the M_s temperature of the steel being treated. Microstructures obtained by quenching SAE 52100 from the austenitizing temperature of 1550° to 475°F and holding for time periods of 1 min, 2 min, 16 min, and 1 hr are shown by the photomicrographs in figs. 5, 6, 7 and 8, respectively. The gradual change from the martensitic structure in fig. 5 to the tempered structure shown in fig. 8 is very obvious. This series of photomicrographs was taken of

specimens at 1000X which had been etched in Vilella's reagent.

As to just which steels may be successfully hardened by either marquenching or martempering depends entirely on two factors; (1) the critical cooling rate of the steel, and (2) the amount of agitation in the quenching bath. In general it is safe to assume that the above practices may be used on any steel that can be hardened by a direct oil quench. There are steels which would normally require a water quench that can be successfully martempered or marquenched by applying an extremely violent agitation in the quenching

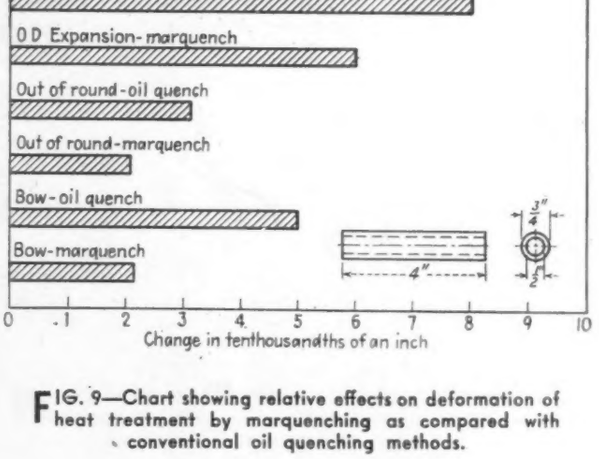


FIG. 9—Chart showing relative effects on deformation of heat treatment by marquenching as compared with conventional oil quenching methods.

bath. Nearly all higher carbon low alloy steels, alloy carburizing types and steels of the medium carbon alloy types, will lend themselves to the above practices.

Austempering, which was mentioned and defined previously, will not be discussed at any length because most people are familiar with the possibilities as well as the limitations of the process. Due to the difficulty of avoiding the formation of pearlite because of the relatively high temperature of the quenching bath, the process is usually confined for use only in treating parts that are very small and with very thin sections. Austempering shows excellent results on very light members such as springs. A salt bath at 600°F, even when violently agitated, has a comparatively low quenching power, so that if parts possessing heavy sections are treated in this fashion the results are usually unsatisfactory because of too much fine pearlite being formed. If, however, the parts can be quenched so as to avoid the formation of pearlite, and thus form a structure of upper and lower bainite, the toughness is far greater than obtained by fully hardening and subsequently tempering to the same hardness.

Much has been published in the past relative to the martempering and marquenching processes and the minimizing of deformation, but in only a few cases have actual comparative figures been given. The author has compiled quite a store of such data. Some of the results of such research work are given in fig. 9. Fifty cylinders made of SAE 52100 were heat treated by marquenching and likewise 50 other identical test cylinders were heat treated using a direct oil quench. A sketch of the type of test specimen used is also shown in fig. 9. These specimens were accurately made 4 in. long, ¾ in. in diam, with a ½-in. bore. After heat treating, all specimens were again accurately measured and the average results of 50 from each treatment are shown in fig. 9. They were all measured for OD expansion, out of roundness, and bowing effect. This chart which shows the average change in 0.0001 in. for each type of quench proves conclusively that deformation is considerably lessened by the marquenching method. The author has found by experience that these results are quite typical of those which may be expected in actual production.

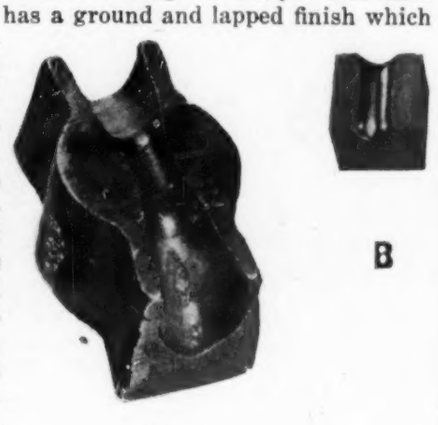
In conclusion, the author wishes again to state that there are many advantages obtainable by the use of the interrupted quench and the variations thereof. To successfully use such a process and obtain consistently the desirable results, it is absolutely necessary: (1) to have good control of the raw material, so that the variables of composition and original grain size will be reduced to a minimum, and (2) to have good equipment and close control of the process itself, so that the time and temperature variables may also be held within a close range.

Cemented Carbide Wire Straightening Dies

USE of tungsten carbide for wire straightening dies used in processing hot wire into concrete reinforcing rods resulted in an increase in die life to more than 300 days, as compared with an average life of 2 days for the chilled iron and brass dies originally used. The tungsten carbide dies were made by Adamas Carbide Corp., New York, for Capitol Steel Corp., New York. The accompanying illustration shows the tungsten carbide dies at *A* and *B*. *A* is a die with carbide insert, while *B* used on smaller sized wires, is a solid carbide die.

Preliminary investigations in developing these dies indicated that for larger sizes of wires, from ¼ to ½ in. diam and up, a carbide insert in a casting (see *A* in the accompanying illustration) resulted in maximum wear. For smaller wire sizes, it was found that a solid carbide die (shown at *B* in the illustration) proved most efficient.

The carbide dies were installed in March 1946 and have been used 300 days without replacement. Previously used dies lasted an average of 2 days. The solid carbide die (*B*) has a ground and lapped finish which is said to minimize scoring and scratching of the wire where finish is important. Officials of the Adamas company report that these carbide dies can be used on Lewis, Sleeper & Hartly, Shuster, Wells and other types of wire straightening machines.



Analysis of Waste Pickle Liquor

By R. D. HOAK
Senior Fellow,
Mellon Institute of Industrial Research,
University of Pittsburgh,
Pittsburgh

Since pickling rate is adversely affected (1) by the use of an inhibitor, (2) as the acid in the bath is consumed, and (3) as the concentration of ferrous sulfate in the bath increases, efficient operation requires reasonably accurate analytical control over the composition of the pickling solution. Reliable methods for analysis of waste pickle liquors which have given satisfactory results are outlined in detail. Analysis procedures for manganese, zinc and copperas are also given, as well as a rapid test for basicity of lime used for pickle liquor disposal under any combination of temperature and reaction time conditions.

THE removal of oxide scale from ferrous metal products to prepare them for further processing is accomplished by a variety of means. Pickling the semifinished stock in dilute sulfuric acid is practiced extensively, and this method of scale removal accounts for more than 90 pct of the steel so treated. Accordingly, this article deals chiefly with the analysis of sulfate waste liquor.

Both batch and continuous processes are used in pickling steel. In the former, the stock is suspended in the bath in racks or in bundles. Pickling efficiency is usually increased by oscillating the stock in the bath (plunger type) or by raising and lowering the liquor level (surge type) to insure that the metal is continually wetted by fresh pickling solution. The time required for scale removal by this method ranges from a few minutes to an hour or more, depending on the scale thickness, and the temperature and degree of exhaustion of the bath. The spent liquor from batch pickling will normally contain 0.5 to 2 pct free sulfuric acid and 15 to 22 pct ferrous sulfate.

Additional recent discussions on waste liquors were published in THE IRON AGE *as follows: "Disposing of Plating Room Waste Liquors," Aug.* 8, 1946, *p.* 71; *"Pickling Acid Consumption Reduced," May* 2, 1946, *p.* 71; *"Lime Treatment of Waste Pickle Liquor," June* 26, 1947, *p.* 45.

Scale is removed from a very large tonnage of strip steel in continuous picklers. In this operation the steel strip passes from a feed reel to a scale breaker, which flexes the strip to loosen the scale; to a stitcher, where a fresh strip is attached to the one ahead; to a looping pit, which holds enough slack strip to permit the pickling line to operate while a fresh coil is being started; through a series of tanks containing pickling solution; through a rinse tank; to a shear, which cuts off the stitched end of the strip; and to a reel on which the pickled strip is recoiled. The actual pickling time is approximately 1 min per unit area. The composition of the liquor from continuous picklers usually falls in the range 4 to 7 pct free sulfuric acid and 14 to 16 pct ferrous sulfate.

The dissolution of part of the scale and a little of the base metal results in the accumulation of ferrous sulfate in the bath. Acid attack on the metal is undesirable, and it is held to a minimum by the addition of an inhibitor; but the pickling rate diminishes as the concentration of inhibitor is increased, and the optimum concentration is set by an economic balance between pickling rate and metal loss. Pickling rate decreases as the acid in the bath is consumed, and the rate is maintained by additions of fresh acid from time to time. But pickling rate also decreases as the

concentration of ferrous sulfate increases, and finally, the spent liquor must be discarded and a fresh bath prepared.

Ferrous Iron and Free Acid

Efficient control of the pickling operation requires a reasonably accurate analytical procedure that is simple enough to be used by the average semiskilled workman. In a number of mills, the fact that pickle liquor contains a small amount of ferric iron forms the basis for a routine determination of free sulfuric acid. A sample of the liquor is pipetted into a flask, a few drops of potassium thiocyanate solution added, and the sample tritrated with sodium hydroxide to the disappearance of the red color. The sodium hydroxide is standardized at such a value that the burette reading is numerically equivalent to grams of sulfuric acid per 100 ml of liquor.

Ferrous iron is determined by titrating a sample with dichromate, using diphenylamine as an internal indicator. The effect of ferric iron is masked by adding about 10 ml of tritration mixture (150 ml H_2SO_4 and 150 ml H_3PO_4 made up to a liter with water); to this titration mixture may be added 15 ml of the indicator solution (1 g diphenylamine in 100 cc concentrated H_2SO_4), thus providing about three drops of indicator for each 10 ml of titration mixture. When this method was first adopted, the operators found the concept of ferrous iron confusing, and, as ferrous iron in the liquor is equivalent to sulfuric acid consumed, the dichromate is now standardized so that the burette reading is numerically equivalent to grams of sulfuric acid consumed per 100 ml of liquor. Potassium dichromate is particularly useful for routine control work because the pure salt can be made up to the desired strength without standardization.

Ferric and Ferrous Iron

Determination of ferrous iron with permanganate is often preferred in the laboratory because this reagent serves as its own indicator. It is only necessary to pipette a suitable volume of the liquor into 10 ml of titration mixture in a flask and titrate with 0.1N permanganate to the first appearance of a permanent pink (1.0 ml 0.1N $KMnO_4 \simeq 0.005585$ g Fe^{++}). The size of the sample will be governed by the strength of the liquor; for accurate work the sample should be large enough to require at least 25 ml of permanganate Where the liquor is of average composition (170 to 190 g $FeSO_4$ per liter), it is preferable to dilute a 10 ml sample to 100 ml in a volumetric flask with 10 pct sulfuric acid and take a 25 ml aliquot for titration. This procedure will normally result in a titration of about 30 ml. Excess acid is essential to prevent oxidation of the ferrous iron on dilution.

Total iron is most rapidly and accurately determined by the Zimmerman-Reinhardt method. A filtered or decanted sample of suitable size (2 ml of average liquor) is pipetted into 20 ml of 1:3 hydrochloric acid and the solution heated nearly to boiling. Stannous chloride solution (150 $SnCl_2 \cdot 2H_2O$ dissolved in 300 ml HCl and diluted to 1 liter with water) is added dropwise until the ferric iron is completely reduced, then one more drop is added. The solution is rapidly cooled in ice-water and 10 ml of saturated mercuric chloride solution added, all at once. The precipitate which forms should be silky white. If the precipitate is gray, or if no precipitate forms, indicating that too much or too little stannous chloride was added, the sample must be discarded. After a few minutes the solution is washed into 400 ml of cold water containing 25 ml of titration mixture (add a cooled mixture of 400 ml each of H_2SO_4 and syrupy H_3PO_4 in 1200 ml of water to 200 g $MnSO_4 \cdot 4H_2O$ dissolved in 1000 ml of water). Titrate with 0.1N permangante to a definite pink color. The difference between total iron and ferrous iron is ferric iron.

This procedure is applicable to the determination of the Fe^{+++}/Fe^{++} ratio in precipitates of mixed iron oxides. An unmeasured quantity of the material is dissolved in sufficient hydrochloric acid, and total and ferrous iron determined on two equal portions of the sample. It is essential that titration mixture be used where hydrochloric acid is present to avoid interference from the chloride ion.

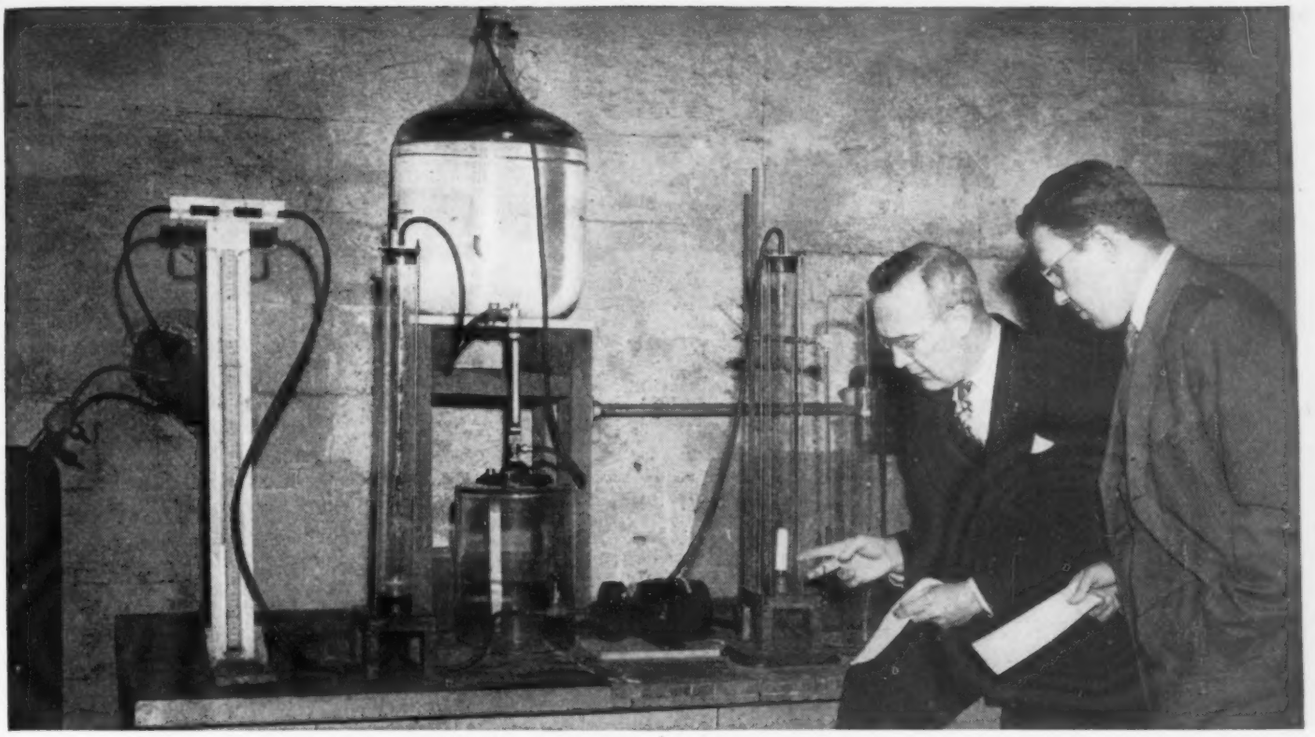
Acid Value

The gravimetric determination of sulfates by precipitation with barium chloride is timeconsuming and subject to error in the hands of an unskilled analyst. A rapid method, yielding results accurate to 0.2 pct, depends on the insolubility of hydrated iron oxides in excess alkali. A sample of the liquor is pipetted into 50 ml of water in a small beaker, a 25 ml excess of 0.5N sodium hydroxide added, and the mixture heated to boiling for approximately 1 min. The black precipitate is filtered with vacuum and washed with four 10-ml portions of water. Filtrate and washings are titrated with 0.5N sulfuric acid using bromthymol blue indicator, and the net sodium hydroxide consumed calculated to grams of sulfate ion per liter. Instead of filtration, the boiled mixture may be washed into a volumetric flask and an aliquot of clear supernatant liquid taken for titration. A pickle liquor of average composition will contain approximately 180g of sulfate ion per liter. A 10 ml sample of such a liquor should be treated with 35 ml of 0.5N sodium hydroxide to provide a titration of about 28 ml of 0.5N sulfuric acid.

This method of sulfate determination has the merit of rapidity (20 min per sample), and it is sufficiently accurate for process control.

Manganese

Aside from iron, manganese is the only metal normally present in pickle liquor in significant amount; concentrations up to 0.3 g per liter are commonly encountered. The metal may be estimated with fair accuracy by oxidation with lead peroxide, followed by colorimetric comparison with a standard. A sample containing not more than 0.2 mg manganese is boiled with 2 ml of concentrated nitric acid and about 0.5 g lead peroxide added in small portions. The mixture is boiled for 2 min, allowed to stand until cool, and filtered through a small asbestos filter into a 20 cm tube graduated in ml. The filter is washed with the



● Development of a process for treating waste pickle liquor at Mellon Institute.

smallest possible amount of water and the combined filtrate mixed by shaking. In a second tube of the same size is placed a measured volume of standard permanganate solution which is diluted with water until the two liquids have the same shade when viewed horizontally. The manganese in the sample is calculated from the ratio of the two volumes and the strength of the standard permanganate.

Colorimetric methods are particularly useful for determining manganese because of the low concentrations usually involved. Where concentrations are relatively high or the greatest accuracy is required, the bismuthate method should be used.

Zinc

Waste pickle liquor is sometimes used by galvanizing plants to strip zinc from products which do not pass inspection. Analysis of spent liquor for zinc involves some difficulty due to the presence of excessive iron. Where this determination is necessary, it is recommended that the standard procedure for separation of the zinc as a sulfide, followed by titration with potassium ferrocyanide, be used. This is the only method that is applicable to all zinciferous material, and it yields accurate results. Shorter procedures may lead to erroneous data in the hands of an analyst who has had limited experience with zinc.

Copperas

Ferrous sulfate heptahydrate (copperas) loses water on exposure to dry air and its iron gradually oxidizes. The salt may be analyzed rapidly by dissolving a weighed sample in 10 pct sulfuric acid and following the methods given above.

Basicity Factor

The most common method for pickle liquor disposal is treatment with lime and discharge of the slurry to a subsidence basin. Limes vary in their reactivity and available basicity, but standard chemical analysis is timeconsuming and yields no information about reactivity. The basicity of a lime under a given set of conditions can be determined quickly by heating a sample with an excess of sulfuric acid and titrating the excess with sodium hydroxide.

An excess of about 35 ml of 0.5N sulfuric acid (120 ml for an average lime) is added to an accurately weighed sample (1.3 g) of lime which has been thoroughly slaked in about 15 ml of hot water. The mixture is washed into an Erlenmeyer flask, heated to boiling for 15 min, cooled to room temperature and titrated to a phenolphthalein end point with 0.5N sodium hydroxide. The net acid required is calculated to grams of calcium oxide per gram of sample.

This method can be adapted to any combination of temperature and reaction time. It yields reliable data on the calcium oxide equivalent of lime which will be available under the conditions chosen; the factor includes, in terms of calcium oxide, all of the compounds which will react with sulfate ions. Basicity factors for hydrated lime and pulverized limestone are determined similarly.

This article was prepared as a contribution by the Multiple Industrial Fellowship which the Stream Pollution Committee of the American Iron & Steel Institute has sustained at Mellon Institute since 1938.

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How to Increase Tolerances And Obtain Closer Fits

By EDMOND E. BATES
Bates & Boswell, Management Engineers, Los Angeles

Solving the problem of how to meet the engineering department's demands for a close fit while at the same time opening up manufacturing tolerances in order to reduce scrap losses, is described herein. Taking as an example a precision part on which rejections ran up to 40 pct, the author shows how statistical control was applied to eliminate scrap, by increasing tolerances while simultaneously improving the quality of the fit.

THERE is a belief current in industry that in order to obtain a closer fit between mating parts, it is always necessary to reduce tolerances. Interchangeability, noninterference between parts on assembly, precision as an index of quality; in fact, mass production itself is based on this belief. This article will test the soundness of this apparent truth which has such an important bearing on the final cost of manufactured products.

When production started at Northrop Aircraft, Inc., on a new artificial wrist for war amputees, one critical part was causing much trouble because of excessive rejections. One dimension was the cause of most of the difficulty—the OD of a shaft on the core of the wrist, shown in fig. 1. This shaft had to be held to a tolerance of +0.000 and −0.001 in., as it backed up a thin ring which took the thrust of the main bearing of the wrist. If there was too much clearance between the shaft and ring, a bind would develop that interfered with the action of the mechanism.

After 2 months' effort, using conventional methods, had failed to improve the results, the superintendent of production engineering decided to ascertain if statistical control methods could help in any way.

The first step taken by the statistical methods engineer assigned to the problem was to determine what had already been done. It developed that the machine shop supervisor felt that he could produce the parts within tolerance because he had already made a few parts within specifications and could see no reason why the rest of the parts wouldn't be acceptable. Subsequent production did not bear out this judgment because 45 pct of the parts had been rejected by inspection. The design engineers had been requested to relax the tolerance, but due to the critical nature of the fit with the mating part, this was impossible. In fact, the engineer wanted an even closer fit but felt that this was uneconomical because of previous experience with the machine tools available. For 2 months the best machine shop and tooling men had tried everything they knew, with the machine available, but the results at the end of that time had not improved. Grinding equipment was not available and only one lathe would even come close to making the parts.

Under conditions then prevailing, it appeared that:

(1) Engineering department could not widen the tolerance without impairing the function of the part, (2) production could not meet their schedule because of rejects, (3) inspection was under pressure because of the rejections they were forced to make, (4) the original cost estimate was far below the actual expense, and (5) sales couldn't meet delivery promises.

After the above findings had been reviewed, the next move was to find out what results the machine and the operator were actually getting—in other words, replace the personal opinions and trial and error methods that were being used, with a statistical analysis of the operation. This is always necessary in a problem of this kind, as it establishes a sound foundation from which to work, but extreme caution should be employed in the use of statistical methods in this type of analysis. The formulas cannot be applied blindly.

The first step to be taken is to develop a frequency distribution curve*.

For example, in the case used for illustration, the

* *See "Sampling Techniques Applied to Quality Control" and "Practical Aspect of Modern Quality Control Methods,"* THE IRON AGE, *Dec.* 12, 1946 *and Apr.* 10, 1947.

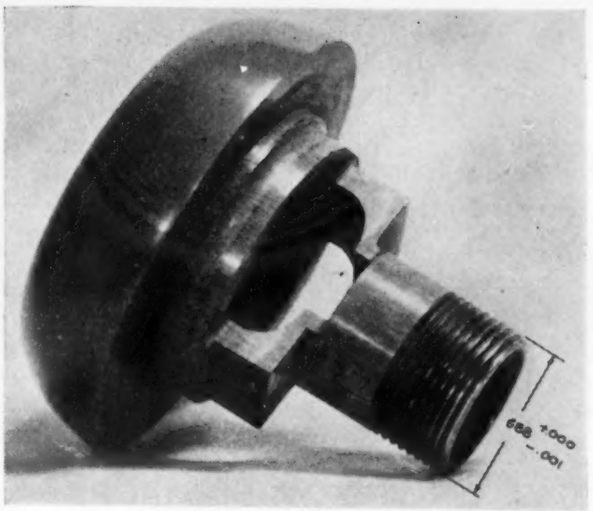


FIG. 1—Because of the close tolerance indicated on the OD of the shank, rejections on this part were 40 pct in spite of the best efforts of the production department.

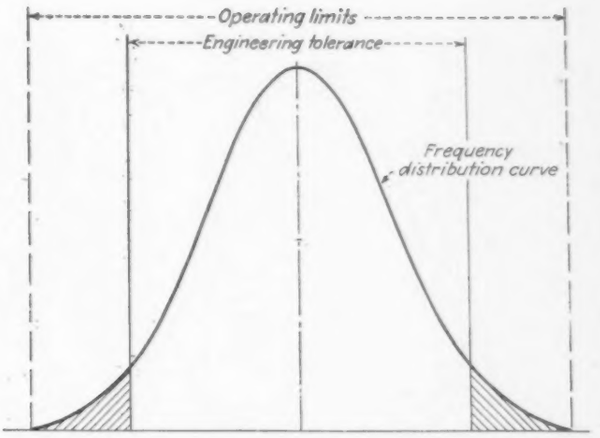


FIG. 2—Frequency distribution curve indicates the difference between the specified engineering tolerance and the practical operating limits.

curve shows that under the conditions in which the parts were produced, there will be a few parts as large as 0.005 in. above the average, and a few as small as 0.005 in. below the average of the lot. There will be no parts produced that are larger or smaller than these. The operating limits for this operation, established by the specific machine setting, material, tools, operator and other conditions that were active when the parts were produced are ±0.005 in. Thus the frequency distribution curve establishes the operating limits and these limits may be shown by lines drawn at the extreme of the curve as shown in fig. 2.

These operating limits establish a basis for comparison between engineering tolerance and actual production. If the tolerance is greater than the operating limits, which are in this hypothetical case ±0.005 in., then all parts produced under the existing conditions will be acceptable. On the other hand, if the engineering tolerance is less than the operating limits, as shown in fig. 2, it will be impossible to make all parts to specification. A certain percentage of rejections is inevitable. This percentage is represented by the shaded area under that part of the curve that extends beyond the engineering tolerance.

Establishing the Curve

In the case under consideration, 60 parts were taken in order of production, measured and segregated into 13 groups of five. The arithmetical average of each group was computed, and from these the grand average of all groups was determined. This established the position of the curve in relation to the engineering tolerance. The range, or the difference between the largest and the smallest part in each group, was computed, and from this data the average range of all the groups determined the width of the curve and the operating limits.

These original data are shown in table 1 and are substituted in the statistical formulas. The results of these computations show that the position of the curve is fixed at 0.68742, which happens to be very close to the midpoint of the engineering tolerance. The operating limits, or width of the curve, extends 0.00177 from the average.

It is immediately evident from the distribution curve that was drawn from these original data, as shown in fig. 3 (A), that under the operating conditions that produced this curve, rejections were inevitable. In fact, the shaded areas that extend beyond the engineering tolerance showed that 15 pct of the parts were larger and 25 pct were smaller than the specifications permitted. The total of 40 pct rejects, as computed, was very close to the previous inspection experience with the part. Since 0.68742, the average measurement of the lot, is so close to 0.6875, which is the mean of the engineering tolerance, it was evident that nothing was to be gained by changing the machine setting.

A statistical analysis of all the data from which curve (A) was constructed indicated that the majority of the difficulty was in the lathe itself. It was recommended that the machine be overhauled. The supervisor of the machine shop still believed that if the operator could produce 60 pct of the parts within tolerance he should be able to make the other 40 pct the same way. This is a very common belief. However, he agreed to have the machine repaired since

TABLE I

Measurements of Parts—12 groups of 5

	A	B	C	D	E	Total	Average	Range
1	.6863	.6873	.6877	.6872	.6882	367	.68734	.0019
2	83	74	71	75	69	372	744	14
3	71	73	75	72	78	369	738	7
4	70	74	74	75	73	366	732	5
5	76	73	66	75	58	348	696	18
6	81	70	73	73	75	372	744	11
7	71	88	68	75	78	340	680	20
8	78	81	84	73	77	393	786	11
9	72	79	81	81	68	381	762	13
10	80	84	81	81	68	394	788	12
11	75	79	81	78	60	373	746	21
12	82	70	73	78	73	376	752	12
						Total.	8902	164
						Aver.	(X).68742	(R.)00137

Operating Limit $X \pm 5 A_2 R$.....
A_2 for groups of 5 = .577.....

Upper Limit = .68742 + .00177 = .68919
Lower Limit = .68742 − .00177 = .68565

everything else had failed to produce an acceptable result.

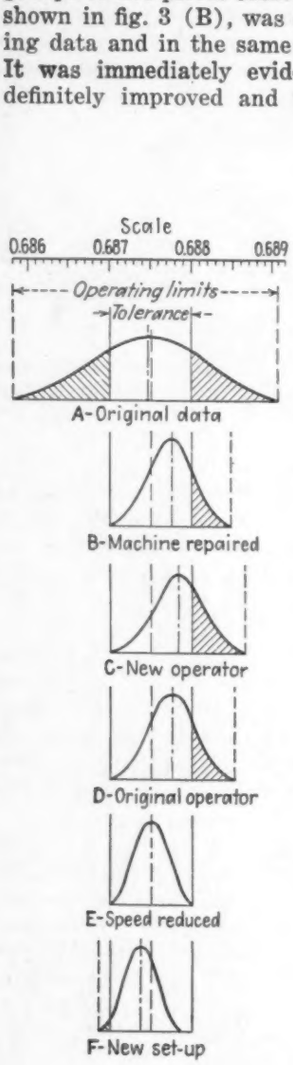
When the repair work was completed, a second lot of 30 parts was run. Again the parts were taken in order of production, measured and segregated into six groups of five pieces each. The new distribution curve, shown in fig. 3 (B), was constructed from the resulting data and in the same manner as explained above. It was immediately evident that the operation had definitely improved and that the conclusions drawn from the analysis of the original data were correct. However, the engineering tolerance was still less than the operating limits, or width of the curve, so that rejects were still inevitable, though there would not be as many. In this case the machine setting, as indicated by the average measurement of the lot, was greater than the mean of the tolerance. In other words the center line of curve (B) is above the center line at 0.6875 which represents the mean of the tolerance. With this setting, all rejects produced would be oversize and reworkable.

At this point it was decided to change operators in spite of the fact that supposedly the best man available had been assigned to the work. No stone could be left unturned and besides it is usually uneconomical to be tied to one operator. Another run of 30 parts was made by the new man. The results were measured, grouped and analyzed in the same manner as the two previous runs. Curve (C) showed that the operating limits were even wider than (B) and that the machine setting was also higher. Rejects were still inevitable but the analysis showed that the original operator was better, so he was put back on the job.

The fourth lot of 30 parts was produced by the original man. Curve (D) shows that he practically duplicated the lot illustrated by (B). It was then apparent that everything had been done that could be with that operator and the lathe running at the planned speed. It was then decided to reduce the speed of the operation. The fifth lot of 30 parts was run and curve (E) showed that the operating limits were just meeting the engineering tolerance. While under these conditions no rejects would be made, there was absolutely no leeway for variations in tool setting between runs, and no allowance for tool wear during a run. In addition, production had been practically cut in half. Another run was made under the same conditions which verified these conclusions as shown by curve (F). The operating limits were the same as before but the curve had shifted because the tool setting was slightly lower. This shift would produce some parts under the tolerance which would be rejected.

At this point it appeared that everything had been done that could be done with the available machine, operator, material, and tolerance specified. While the rejections would be greatly reduced, the net production would not be much better than it had been originally because of the reduced operating speed. No one, including the statistical methods engineer was very happy with the results obtained except the operator, since he was exonerated from the responsibility for the previous trouble. At least it had been proved that 60 pct good parts is no guarantee that the remaining 40 pct would also be acceptable. A summary of the progress made did not look too encouraging.

(1) The engineering position had not improved.
(2) There would still be some rejections, so inspection still had to check all the parts.
(3) Production still could not meet schedules at the reduced speed.
(4) Costs would still be too high because of reduced production.
(5) Sales could not meet their promises.
(6) Management would still be faced with a substantial loss on the contract.



LEFT

FIG. 3 — Series of distribution curves showing the effects of changing production conditions upon the number of rejections.

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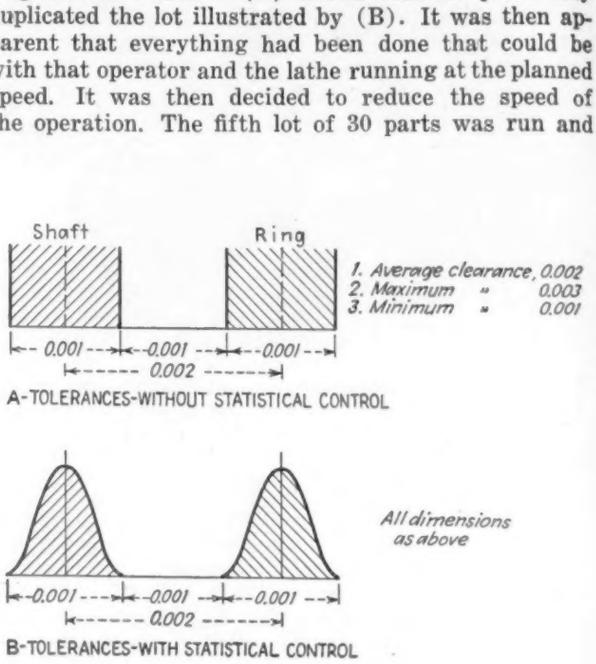
FIG. 4—Graphical representation showing engineering tolerances and clearances as set by conventional methods (A), and the same tolerances considered in the light of statistical control (B).



The only avenue left open was to obtain an increase in engineering tolerance. As previously stated, this had already been tried and the request had been refused for functional reasons. In fact the engineer reiterated his desire for a still closer fit between mating parts. The next move was to apply statistical methods to the engineering tolerance to see if something could be done in this direction.

A sketch of the conventional method of setting engineering tolerance was made, as shown in fig. 4 (A). In the case at hand there was a tolerance of 0.001 in. for the shaft and 0.001 in. for the ring, which was the mating part. The design engineer had set a clearance of 0.001 in. between these mating parts, which is the conventional method of establishing such clearances. This made the average clearance 0.002 in., and it is this dimension that is critical to the proper functioning of the mechanism. Without statistical data on production there is no other way to establish tolerances, and as a consequence the engineer has no choice.

Since the statistical data on the turning operation were now available, the statistical picture of the tolerance could be drawn. The hole in the mating part was finish reamed and a check revealed that the operating limits on that part were well within specifications. Therefore the worst conditions that were likely to occur in the production of this mating ring would produce a frequency distribution curve only as wide as the tolerance specified. As a result this condition was assumed. The two distribution curves for the shaft and the ring were then substituted for the pictures of the conventional tolerances. It is evident at once in fig. 4 (B) that the 0.001 in. clearance between mating parts is entirely unnecessary. There is only about one chance in half a million of picking the largest shaft and the smallest ring for the same assembly, so the interference would be negligible. Statistically controlled production would eliminate the chance of interference on assemby, so that the 0.001 in. clearance is no longer necessary and can be used to increase the engineering tolerance where it is most needed. Since the ring is giving no trouble, it is obvious that the extra 0.001 in. should be allowed on the shaft where it is needed. Proposed tolerances No. 1 in fig. 5 illustrates what would happen. The tolerance on the shaft would be increased 100 pct but —what would happen to the average clearance which was originally 0.002 in. When the width of the curve is increased from 0.001 in. to 0.002 in., its position also shifts. The average clearance would now be 0.0015 in. instead of 0.002 in., or 25 pct closer. This of course means that the average fit between mating parts would be 25 pct closer.

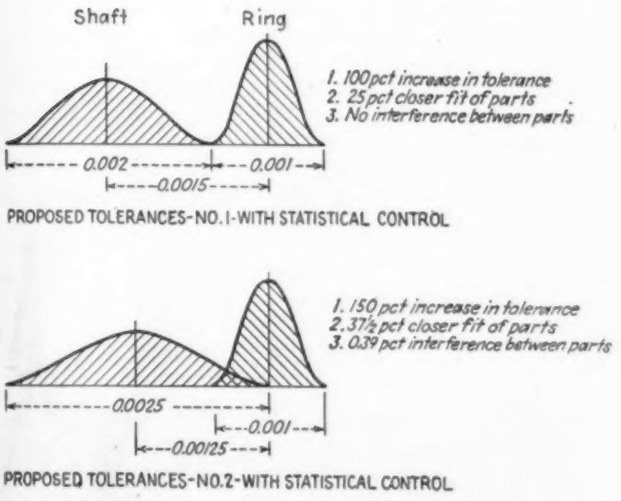


FIG. 5—By increasing the tolerance 100 pct as shown at No. 1, the fit is improved 25 pct and intereference is zero. By increasing 150 pct as shown at No. 2, fit is 37½ pct better and interference is only 0.39 pct.

The wider the tolerances are in any machining operation the more production can be increased and less rejects will be made. For this reason it was decided to try to increase the tolerance still more. The width of the distribution curve was extended to the average of the mating part, an increase of 0.0005 in. This would increase the shaft tolerance two and one half times the original as shown by proposed tolerance No. 2 in fig. 5. Since the two curves overlap, it appears that the two parts would interfere on assembly. At first glance this seems impractical. However, statistics again supply the answer by showing that the resulting interference would only occur four times in 1000 assemblies. A check of the assembly operation proved that this could be neglected since it would not retard production. It would only mean dropping one ring and picking up another for a perfect fit.

How would this additional increase of 50 pct affect the average fit of the mating parts? It can readily be seen in the illustration that the average clearance would again be decreased from 0.0015 in. to 0.00125 in. which would improve the fit 37½ pct over the original clearance. The problem which at the outset had appeared impossible had been solved. It had all been accomplished through the statistical analysis of only 210 parts and a few hours time.

The next move was to sell the chief engineer on increasing the tolerance of the shaft. This time, however, there was no question as to the validity of the request. As soon as the pictures illustrated were explained, he saw the soundness of the conclusions. He approved both proposals, but it was evident that the shop would choose No. 2 since it allowed the wider tolerance. One provision was made, however; both parts must be produced under statistical control. This, of course, is obviously essential since it is the only way to hold the measurements of the parts produced within a frequency distribution curve that has the correct relationship to the specified tolerance.

Production proceeded on this new basis, and it was not long before everyone was happy.

(1) While the engineer increased the tolerance 150 pct, he gained 37½ pct closer fit, thus improving product quality.

(2) Production could catch up on their schedule because production was increased beyond the original estimate.

(3) Inspection could substitute sampling inspection for 100 pct check and the pressure was off.

(4) The cost was now lower than the original estimate because of increased production and elimination of rejections.

Increasing tolerances for closer fitting parts was no longer a paradox but rather an entirely new concept of the relationship between tolerances, quality, production and costs. It is doubtful if there is another tool available to industrial management that can accomplish so much for so little.

How to Select Hard-Facing Materials

By H. W. SHARP
Metallurgist,
Stoody Co.,
Whittier, Calif.

In this highly informative article the author discusses the four major groups of hard-facing alloys and points out the general fields of application for each group. Photomicrographs are presented of the structure of each type to show why it possesses its particular characteristics, and examples are given from current industrial applications, together with factual information on the economies effected through hard-facing.

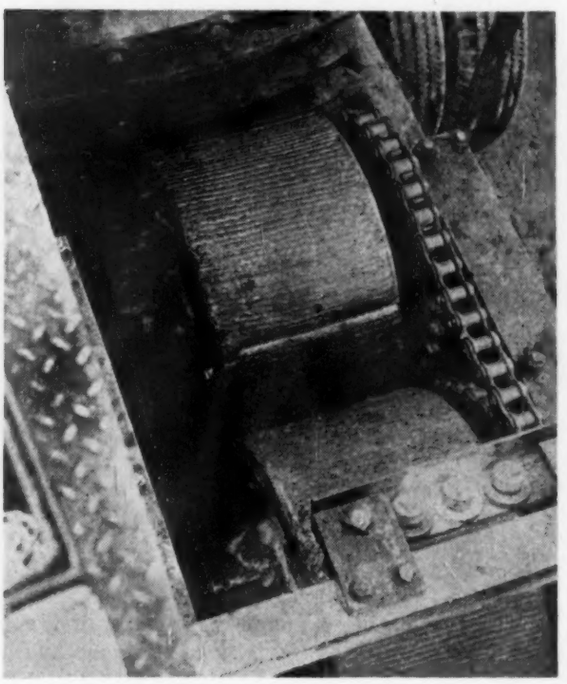
INDUSTRY today generally recognizes the vital part hard-facing plays in increased production. Discussion no longer turns on whether to hard-face, but on what hard metal is best adapted to the conditions involved. Production men and designers must frequently choose between various types of hard-facing alloys in the selection of the one particular material that best meets the factors presented by a specific operation. These factors may include abrasion, impact, corrosion, heat or a combination of any or all of them.

The structure of hard-facing alloys basically determines their effectiveness, yet comparatively little is known about it. It has been determined that all hard-facing deposits are heterogeneous, being made up of various hard carbides held in a softer and tougher matrix; the carbides establish the wear-resistant properties of the deposit. Most important of these carbides are those of tungsten and chromium, together with those of several other carbide-forming elements. Carbides are extremely hard, with consequent brittleness, and to perform their function in hard-facing materials they must be held in a matrix, usually iron, although cobalt and nickel are frequently used.

It is customary to classify hard-facing alloys in

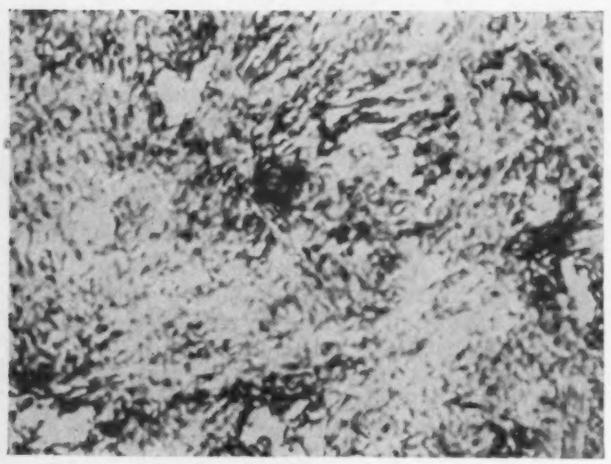
RIGHT

FIG. 2—Tires for these crusher rolls are hard-faced with group I material in transverse beads to maintain crushing efficiency and reduce maintenance costs.



BELOW

FIG. 1—Photomicrograph at 1000 X of group I hard-facing alloy showing the austenitic structure which enables this material to withstand heavy impact.



groups depending upon types of alloys and alloy content. These groups are more or less arbitrary, but will serve for the purpose of general discussion. Group 1 consists of iron base materials with an alloy content of less than 20 pct; the alloys generally range from 5 to 14 pct and include such elements as chromium, manganese, silicon and frequently minor quantities of tungsten, molybdenum and nickel. These rods, ordinarily made of alloy-coated wire or alloy-filled tubes, are in the low-cost bracket.

Group 2 is again made up of iron base materials, but here the alloy content varies from 20 to 50 pct; the alloys may consist of chromium, tungsten, molybdenum, nickel, cobalt, boron, manganese, silicon, vanadium and zirconium. Rods in group 2 are usually cast. Costs of these rods are necessarily higher than those of group 1 because of the alloying elements used.

In group 3 are the nonferrous alloys of the cobalt-chromium-tungsten type with minor quantities of other elements. The combined percentage of carbide forming elements is between 30 and 40 pct. This alloy combination is used in producing metals having good wear resistance even at red heat in combination with resistance to corrosion. The alloys cannot be forged or hot drawn and are therefore produced in cast form. Group 3 rods are among the highest cost hard-facing alloys.

The fourth group covers tungsten carbide contained in steel tubes. These rods are supplied with tungsten carbide particles accurately screened to any mesh size desired. Rods are made up of generally 60 pct tungsten carbide and 40 pct steel. Since tungsten carbide is not melted by an oxyacetylene flame, deposits from these rods are distinctly heterogeneous, the hard particles being held in a steel matrix.

It may be concluded from the foregoing that with an increase in the proportion of carbide-forming elements in a given alloy, there is an increase in the number of carbides formed and, under normal conditions, an increase in wear resistance.

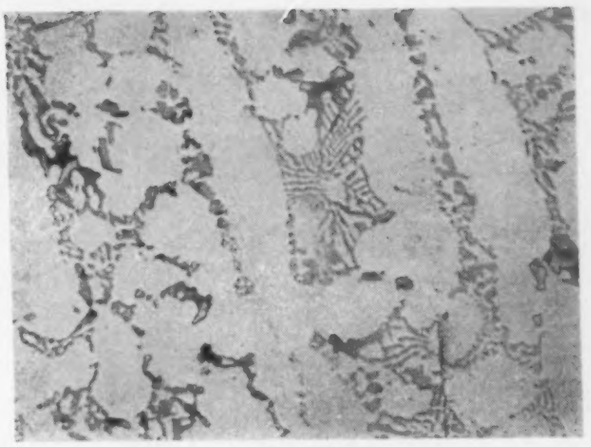
To substantiate field experience, a study of alloy microstructure in each of the groups of hard-facing materials has been made. The result of this study proves conclusively that it is the micro-hardness of the carbides, their distribution and size, which accounts for the greatly increased resistance to wear over plain carbon steels. The elements comprising the matrix determine other physical characteristics, such as resistance to heat and impact.

Carbides of chromium have hardness values varying from 71 to 75 Rc. Tungsten carbide grains have hardness values of 85 to 90 Rc, and combinations of chromium and tungsten carbides average around 80 RC. Micro-hardness measurements on matrix phase, in practically every case, were equal to the actual or real Rockwell hardness as determined on samples by standard procedure. The presence of carbides in the structure does not contribute to the real Rockwell hardness. Under the relatively heavy Rockwell load, the hard carbides are pushed down into the matrix so that the softer material is really supporting all the weight imposed upon the diamond point.

In heat-treated plain carbon or low alloy steels of high hardness even exceeding that of many hard-facing alloys, there are no hard carbides present in the structure. This is the basis on which the much greater resistance to abrasion possessed by hard-facing alloys is explained. In order to demonstrate how hard-facing alloys perform their work for industry, the micro-

RIGHT

FIG. 5—Photomicrograph at 500 X of the lower hardness class of the group 3 alloy. The white matrix is chiefly cobalt with small amounts of chromium and tungsten.



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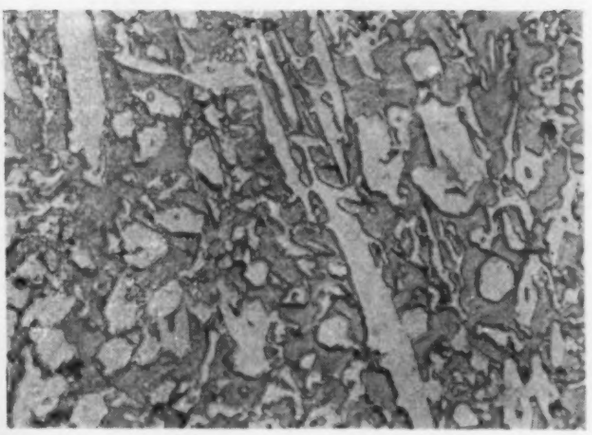
BELOW

FIG. 3—In the structure of this group 2 alloy, the needles of chromium carbide are so well supported that they will withstand sliding abrasion or heavy pressure without fracturing. Magnification 500 X.



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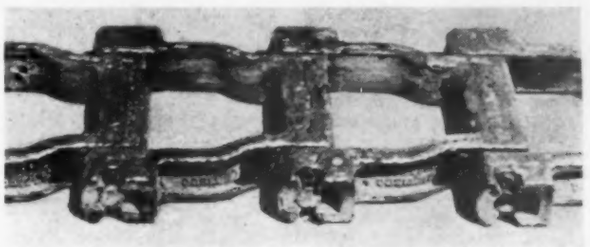

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FIG. 4—Cement mill drag chain links protected against severe sliding abrasion by the use of group 2 alloy which more than doubles the life of the links.

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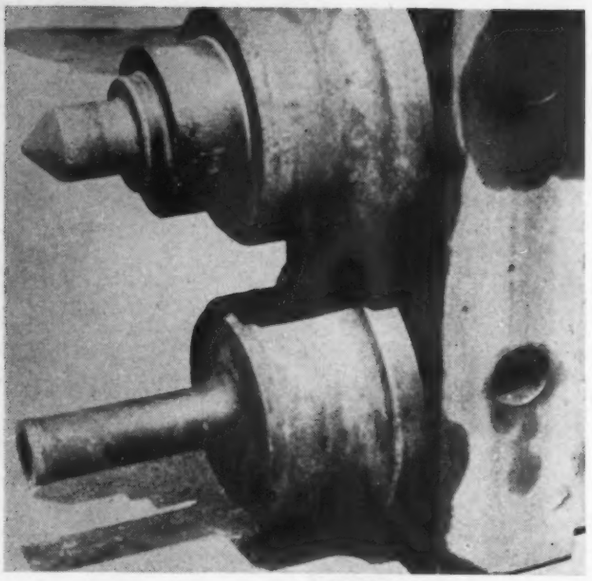

FIG. 6—This hot punch, protected by group 3 alloy, operates successfully at red heat and resists impact, heavy pressure and abrasion by scale.

structure of an alloy of each of the groups will be presented and its structure will be correlated with actual applications.

Group 1 Alloys

Group 1 alloys are employed primarily for applications involving abrasion and impact. Most rods in this group can be hot forged, bond readily with manganese, and are relatively low in cost.

Fig. 1 is a photomicrograph of a group 1 alloy at 1000 X. In comparing this structure with steel there is present martensite, austenite and a few scattered particles of chromium carbide. Due to the presence of austenite, deposits of this type of material will withstand relatively heavy impact without fracturing. The austenitic grain structure of this alloy makes it suitable for welding to manganese steel with assurance of a good bond. The chromium carbide present in the structure contributes to abrasion resistance. The analysis of this particular alloy is 7 pct Cr, 3½ pct Mn, 1½ pct C, with small amounts of silicon, molybdenum and zirconium. Actual hardness of the deposit is 55 Rc. The field acceptance of group 1 hard-facing alloys is very broad and rods in this group have a wide variety of uses in virtually every major industry.

Fig. 2 shows hard-faced crusher roll tires. They may be made of carbon or manganese steels, and in either case they can be kept out to size longer through the application of group 1 alloys, maintaining crushing efficiency and reducing maintenance costs. Cost is a decided factor in an application of this type because several hundred pounds of rod are involved in the rebuilding operation.

Hand picks and tie tamper bars are usually hard-faced with group 1 rods, not only because these alloys resist impact and abrasion, but because they can be hot forged, eliminating relatively expensive grinding operations.

Steel mill wabblers and coupling boxes are also subjected to severe impact as well as abrasion and the use of group 1 alloys on this equipment is accepted as the best means of increasing part life and reducing maintenance cost.

Group 2 Alloys

Group 2 alloys are generally used for equipment subjected to severe abrasion, particularly where a polished surface is required for proper operation. Rods in this group usually offer only moderate resistance to impact.

Fig. 3 is a photomicrograph of a group 2 alloy at 500 X. The structure consists of two phases—the white islands are actually needles of a complex chromium carbide, while the matrix consists mostly of iron and manganese with some chromium dissolved. The chromium carbide particles carry the brunt of wear,

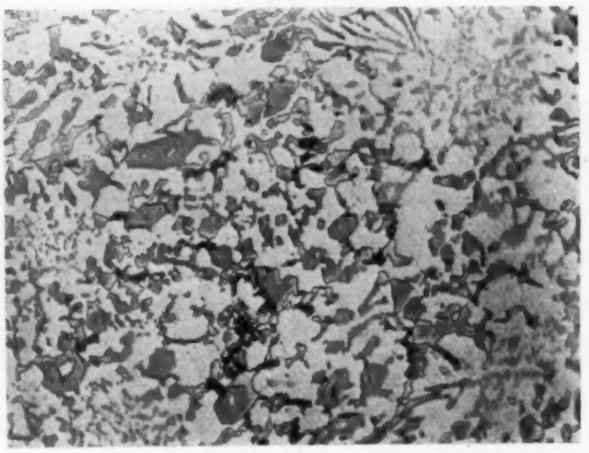

FIG. 7—The higher hardness alloy of group 3 shows a higher proportion of carbides than that in fig. 5, and while it will not resist impact so well it offers greater resistance to abrasion. Magnification 500 X.

and these particles have such strength and backing that they do not fracture and crumble when subjected to sliding abrasion or heavy pressure. The number and distribution of carbide particles make it apparent that this metal will not withstand severe shock or impact, The analysis of this particular alloy is 33 pct Cr, 7 pct Mn, 4 pct C, with small amounts of silicon and zirconium. The actual hardness of the deposit is 56 to 58 Rc. Group 2 alloys also have a wide range of applications in various industries.

An example of the use of a group 2 alloy is on a plowshare. These rods have two decided advantages over other types of materials for use on agricultural tools; first, they offer high resistance to abrasive wear, and second, they scour or polish when subjected to the wearing action of the earth. It is not uncommon for shares hard-faced with group 2 materials to outlast ordinary shares as much as five to one, during which time they retain constantly sharp cutting edges.

Fig. 4 shows the use of a group 2 alloy on a cement mill drag chain link. In this case group 2 alloys are selected because of their excellent resistance to abrasion.

Group 3 Alloys

Group 3 alloys should actually be divided into two classes. The first is a comparatively soft grade which offers good resistance to impact and abrasion in combination with heat and corrosion, while the second,

having higher hardness, lacks the ability to withstand severe shock.

Fig. 5 is a photomicrograph of the softer group 3 alloy at 500 X. There are three phases present: the gray constituent is a complex chromium carbide and the darker particles are a tungsten carbide compound. The white matrix is comprised primarily of cobalt with small amounts of chromium and tungsten dissolved. The alloy has a hardness of 44 Rc and can be machined with sintered carbide tools. Since the matrix does not oxidize readily and since there is no phase change at elevated temperatures, the group 3 alloys maintain good hardness at high temperatures and are suitable for applications involving heat. The presence of hard carbides indicates that it has good resistance to abrasion, while the distribution of these particles and the type of matrix indicate excellent resistance to impact. Cobalt is a noncorrosive element, and when combined with chromium, it will resist most common corrosive media.

Automotive exhaust valves are frequently hard-faced with the lower-hardness group 3 alloy. Parts such as this can be reconditioned by hard-facing for less than the valve's original cost, and the hard-faced valve will outlast two or three untreated valves. During the war, nearly all aircraft valves were hard-faced with one or another alloy falling into group 3 classification. This application is equally effective for large diesel valves, as for railroad locomotives, because of the alloy's inherent resistance to heat and corrosive exhaust gases.

Another application of the cobalt-chromium-tungsten alloy is the hot punch shown in fig. 6 which has operated four times longer than the best tool steel previously tried. The die is fabricated of SAE 1045 steel, hard-faced in the areas which are subjected to wear. The cost of the composite construction is less than half the cost of a new tool steel punch. Similarly, composite construction is suitable for hot shear blades, hot forming and trimming dies subjected to impact, heavy pressures, abrasive action of scale, and high temperature.

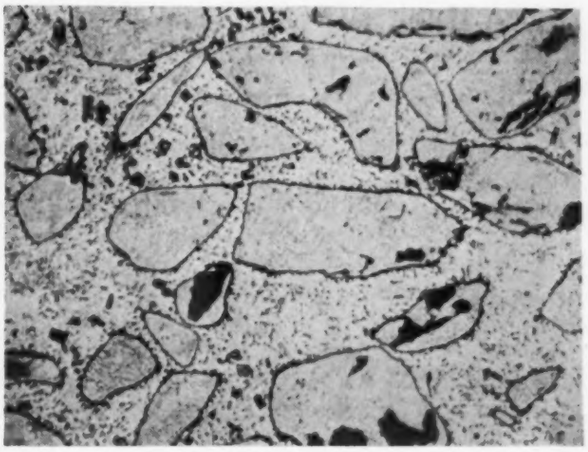

FIG. 8—Photomicrograph at 50 X of a group 4 alloy deposit of tungsten carbide tube rod, showing grains of measurable size of fused tungsten carbide in a steel matrix.

Fig. 7 is a photomicrograph of the second alloy of group 3, the higher hardness alloy. The photomicrograph is at 500 X. The phases present are the same as those in the lower hardness group 3 metal, but there is a greater proportion of carbides, particularly the tungsten carbide compound. Hardness is 54 Rc. Since the hardness and percentage of carbides are higher, this alloy will not resist impact as well as the lower hardness material of the same group, but it will offer considerably greater resistance to straight abrasion. Heat and corrosion resistance are virtually unimpaired at elevated temperatures.

An example of the use of this material is in a hard-faced expeller screw segment that is subject to severe abrasion plus corrosive action, and which sometimes operates under considerable heat. In service, this type of hard-facing material will attain a high polish. Sleeves for centrifugal pumps for severe corrosive and abrasive service are frequently manufactured with an overlay of the high-hardness cobalt-chromium-tungsten alloy. Since there is no impact on this type of equipment, the higher hardness group 3 alloy provides greater life than the lower hardness alloy.

Group 4 Alloys

Group 4 rods, the tungsten carbide group, find their chief use in earth-cutting and similar operations involving extreme abrasion where a polished surface is not required.

Fig. 8 is a photomicrograph of a deposit of tungsten carbide tube rod at 50 X. Here there are grains of measurable size of pure fused tungsten carbide held in a matrix of steel. Cast tungsten carbide is the hardest metallic compound known and, as stated previously, it has a theoretical hardness as high as 90 Rc, as determined by the micro-hardness tests. Because of its extreme hardness, tungsten carbide has the greatest wear resistance of any known material which can be applied by ordinary welding processes. Naturally, tube tungsten carbide deposits wear to a rough surface and consequently are not suitable for parts which must present a highly polished surface for proper functioning. The rough surface, however, in many cases is highly desirable.

Today in the petroleum industry, every rotary drilling tool which enters the earth is hard-faced with one or another type of a group 4 tungsten carbide material. Fig. 9 is a photograph of two rock bits, one of which has seen severe service in drilling operations.

Scarifier teeth used on road beds are another ex-

FIG. 9—Rock bits hard-faced with group 4 alloy. The one on the right has seen severe service in drilling hard earth formations.

ample. This again is an earth-cutting operation. The tungsten carbide deposit is placed on the leading edge of the teeth so that they will be self-sharpening in service as the soft base metal wears away from the hard deposit.

Coal cutter bits commonly used in all underground coal mining operations present another application. A small drop of tungsten carbide material extends life of bits about five times at a cost of less than 1¢.

In addition to the tube rods for oxyacetylene and electric welding, cast inserts of tungsten carbide are made for setting into drilling bits and similar equipment to provide increased wear resistance and greater cutting efficiency. Usually the inserts are alloyed with a small percentage of cobalt or nickel to provide greater toughness without materially decreasing wear resistance.

German Wartime Technical Developments

REPORTS of German practice in numerous technical fields of interest to engineers and executives in the metalworking field, issued recently by the Office of Technical Services, Washington, are briefly described below. These reports are in addition to detailed articles of certain phases of German practice previously published in THE IRON AGE. Copies of the reports listed below may be obtained in either photostat or microfilm form, as indicated. Orders for copies of these Reports should be addressed to Office of Technical Services, Department of Commerce, Washington 25, D. C., giving the "PB" identification number. See THE IRON AGE, June 27, p. 67, Aug. 29, p. 39, Sept. 26, p. 80, Oct. 10, p. 67, Nov. 14, 1946, p. 81, Jan. 9, 1947, p. 64, Jan. 16, p. 53, Mar. 6, p. 70, and Apr. 17, p. 57, for a list of earlier reports.

Soldering Ceramics and Metals—A process developed for soldering ceramics to metals is described. The report covers the composition and preparation of ceramic and metal materials suitable for decimeter tubes and the procedure for bonding. *PB-52343; photostate $2.00; microfilm $1.00; 20 p.*

Hot-Rolled Compound Plates—Hot-roll welding of stainless steel sheets to plain steel backing plates resulted in important advantages as well as economy, according to this report. Notes on other German rolling mill practices are included. *PB-52882; photostat $12.00; microfilm $4.00; 168 p*

Low Grade Ore Beneficiation—A washing tower method of concentrating low grade iron ore which doubles ore concentration and recovers over 90 pct of the iron content, is described. The method is said to be especially suited for ores containing material readily suspended in water. *PB-44964; photostat $1.00; microfilm $1.00; 12 p.*

Forging Practice—This report explains the use of preheating furnaces to keep ingots hot until delivery to the forging furnace, as practiced in Germany. Details of railway axle and wheel production and heat treating, rolling and machining practices are included. *PB-51067; photostat $5.00; microfilm $2.00; 62 p.*

Electroplating—The quality of electroplating is greatly influenced by the size and shape of anodes and method of manufacturing, according to German information included in this report. Composition and the use of anodes are discussed with corrective measures for troubles caused by improper use. *PB-47010; photostat $3.00; microfilm $1.00.*

Nickel Plating—Twenty-one causes of nickel plating failure and methods of preventing such failure, are listed by a German consulting engineer. The report included a bibliography of literature on problems related to the peeling of nickel deposits. *PB-47009; photostat $2.00; microfilm $1.00. 24 p.*

German Silver—Composition, melting and casting of German silver are reviewed with a table giving the composition of 171 types. A discussion of the addition of foundry scrap and old metals to German silver alloy charges and the use of glass scrap as a flux is included. *PB-47008; photostat $2.00; microfilm $1.00; 23 p.*

Anodizing Aluminum—German anodic oxidation methods for forming a protective oxide film on aluminum and aluminum alloy products are described in this report. It is estimated over 70 pct of all anodizing work in Germany involved the use of this process. *PB-49275; photostat $3.00; microfilm $1.00; 33 p.*

Casting Porosity—Twenty-five rules for reducing porosity and blow holes in bronze castings are given. The report criticizes some beliefs and methods found common in foundry practice and analyzes melting and pouring practices with emphasis on the formation and porosity effect of various gases. *PB-44957; microfilm or photostat, $1.00.*

Forging Press—A 30,000-ton German forging press for light alloy forging is described in this report. I. G. Farben's developments in the field of aluminum and magnesium production and fabrication are described and information is given on the German process for recovery of these metals from mixed alloy scrap. *PB-44675; photostat $36.00; microfilm $11.00; 528 p.*

Zinc Recovery—This report covers an amalgam process for recovering on a commercial scale 99.999 pct pure electrolytic zinc from pyrite cinders. Free chlorine is simultaneously produced. A similar process for recovery of manganese, lead, tin, cadmium and thallium is described. *PB-37994, one of 12 reports; photostat $2.00; microfilm $1.00; 23 p.*

Precious Metal Recovery—How the Germans simplified and improved the recovery of precious metals from scrap metal and nickel refinery residues by applying variations of well-known basic processes is told in this report. Recovery of the platinum group of metals is included as well as products manufactured from refined metals and alloys. *PB-4461; photostat $2.00; microfilm $1.00; 27 p.*

Notes On Swedish Acid Openhearth Practice

° ° °

By S. M. WEJLE
Munkfors Steel Works, Uddeholm Co., Sweden

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FIG. 1—Pouring an 0.70 C steel heat. After ingot is poured, the hot top is covered with dry wooden boards.

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IT is generally recognized that Swedish high grade steel is superior to all other quality steels for certain purposes. In such important characteristics as elasticity and fatigue resistance, steel produced in Sweden by the acid openhearth process is outstanding.

These features may be ascribed to the manner in which the acid openhearth process is carried out, thanks to certain resources which are in the nature of a national monopoly. In the first place there is the question of raw materials and although these consist of pig iron and scrap as is always the case with the Siemens-Martin process, there are certain outstanding differences. The pig iron is not the normal product of large coke blast furnaces using ordinary ores and giving rather high sulfur contents. Swedish pig iron is smelted in small furnaces using charcoal obtained from the coniferous forests, the purest metallurgical fuel known. Nowadays the furnaces are often heated electrically and the ores are of the highest quality, containing extremely low phosphorus and sulfur.

The scrap used in the Swedish acid openhearth process consists entirely of discards from the company's own mills and, consequently, it is as pure as the charcoal pig iron and can be completely controlled with regard to analysis. The supply of this type of scrap is limited, although it can be augmented to a certain extent by the use of sponge iron or iron granules which are low carbon irons; the former are produced direct from the ore without melting and the latter from granulated charcoal pig iron.

The furnaces used are small and generally the charge is not more than 20 tons. Furnace design facilitates accurate control of the melting on the basis of practical experience gained over many years. One important factor in producing a good clean steel is to maintain an open boil. The first successful melting of steel utilizing a furnace built on W. Siemens principle of the regenerative heating took place in Sweden at the Munkfors Steel Works of the Uddeholm Co. as long ago as 1864.

Metallurgists from other countries are always surprised to learn that for certain purposes Swedish acid openhearth steel has proved to be superior to steel of the same specification made in the electric arc furnace even when using similar raw materials. A striking example of this is provided by Swedish ball bearings where statistical evidence proves that the best durability and reliability are obtained when the steel is melted by the acid openhearth process.

The unique quality of this material is more strikingly manifested in the case of steel in thin dimensions, such as cold-rolled and hardened strip steel for saws and springs, as well as the very thin sizes used for such special purposes as flapper valves in air com-

pressors (fig.2) and refrigerators; needles and sinkers in textile machinery; reeds for metal wire; cloth weaving; razor blades; measuring tapes; thickness gages, etc., some of which are produced as thin as 0.02 mm (0.0008 in.). These steels are normally supplied in the hardened and tempered condition and it is essential for the hardness and elasticity to be uniform as well as to specification. For this purpose accurate rolling and careful heat treatment are not the only requisites, but it is essential for the raw material to be absolutely uniform and reliable, and preferably also not liable to decarburization. In this respect Swedish acid openhearth steel is in a class by itself.

The bearded needles and latch needles used in hosiery machines are made of steel wire or cold-rolled strip, supplied in the unhardened state to permit punching, slotting and hook swaging for which purpose the steel must be clean and free from hard inclusions. Subsequently, hardening and tempering is carried out to develop the fatigue resistance required to enable the needles to withstand the innumerable bendings to which they are subjected in use. It has been found that other steels have not the same hardenability, whereas Swedish steel has proved to be exceedingly reliable.

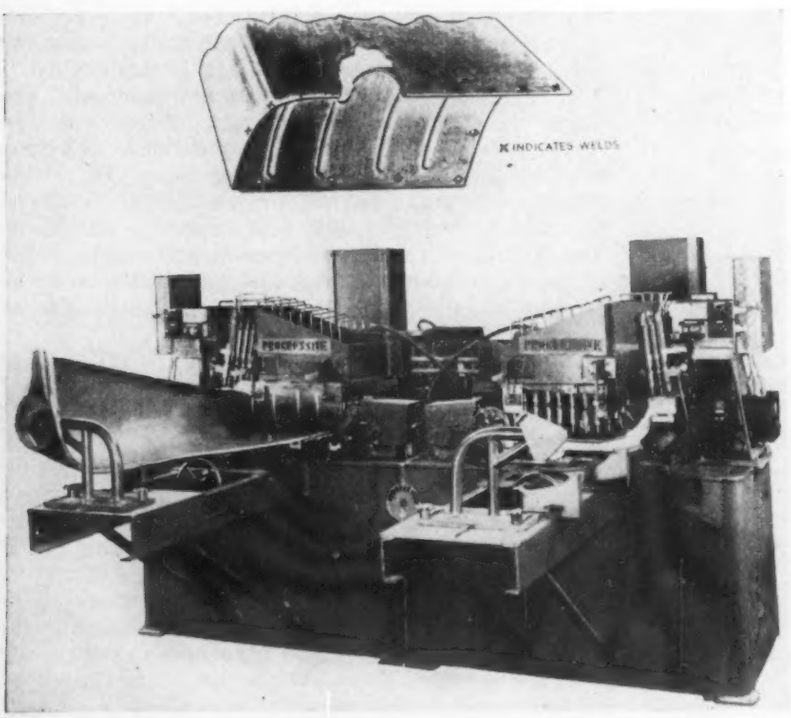
FIG. 2—Flapper valve for air compressor made of cold-rolled, hardened and tempered strip steel.

Production Welder Has High Flexibility

THAT a machine designed for maximum output need not be a single purpose machine is well illustrated by an Ultra-Speed spotwelding machine, shown in the accompanying illustration, recently designed and built by Progressive Welder Co., Detroit, for the welding of dust-shields to fenders for a popular line of automobiles.

Not only will the machine produce both right and left hand front fenders, but by a simple adjustment, made in a few seconds, it will handle two different sizes of fenders interchangeably, at a production rate of 150 assemblies per hour, with 18 spotwelds per fender.

In addition, the machine can be operated at normal production by a single operator—welding right and left fenders alternately — or two operators may be used, one for right and one for left fenders, thereby virtually doubling production.



The machine is so designed that it can be split into two machines if desired at any time for convenience of material routing in the plant. The only additional equipment which would be required in such an event would be a second hydraulic power unit.

Each half of the dual Progressive Ultra-Speed is equipped with its own Ultra-Speed unit; its own transformer, timer and contractor. Note that the headlight gage, used to locate the fender, is made adjustable to suit different fender sizes. A hand-wheel operated lead screw movement for the lower electrodes facilitates electrode and gun maintenance. Guns are of various types, straight, bell-crank, and self-equalizing, to permit locating of the various spotwelds exactly where desired.

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How to Use Carbide Cutters for Milling

. . . Straddle Milling v. Face Milling

By H. A. FROMMELT
Consulting Engineer,
Chicago

Always appearing to offer attractive dividends in the way of higher production, straddle milling with carbide cutters is rarely, if ever, as satisfactory as face milling from the standpoint of actual work output. How the two methods compare on identical workpieces is explained herein by a careful step-by-step analysis that clearly indicates the superiority of face milling on the score of overall costs, finish and accuracy.

STRADDLE milling with its allurements for unit cost reduction by completing the milling of two sides of the same component in one pass, or some such combination as the opposite sides of two identical workpieces, deserves close consideration and detailed study in these days of carbide milling.

There are a good many surface arguments favorable to straddling a job; there are also a good many arguments against it. The favorable contentions are almost all on the surface; those directed against the use of two cutters at one pass usually demand a close and first-hand acquaintanceship with the business of metal removal.

Figs. 78 and 79 present an operation currently being performed in a locomotive builder's plant.

The operation pictured is being performed on a boiler plate component destined as part of a locomotive assembly. The identification of the workpiece material as boiler plate is quite sufficient, though much more satisfying and specific when the specification sheet shows that the carbon content is less than ten points and the Bhn less than 140. In fact, the very first carbide tooth full of this material indicated its true hidden nature; it is sticky and stringy and of that low carbon family that requires special treatment and attention in machining.

The tag boiler plate makes it possible to set the surface rate without hesitation somewhere between 600 and 900 fpm. After the surface foot rate has been specified as indicated, the next step towards the proper planning of a carbide milling job is the cutter selection and specification.

The 10-in. half side mills used for the carbide milling of this job are much like any face mill except in a few details. A half side mill must have a keyway for its assembling on the arbor, whereas this is not true of a face mill. On the other hand the face mill is usually provided with a spindle nose recess for mounting on the spindle of the machine, at least in sizes over 8 in. Since the spindle diameter of milling machines of the knee type is 5 1/16 in., only those sizes of face mills over 6 in. can be so mounted.

These 10-in. mills have ten solid carbide blades mechanically held, and in these details are identical with the face mills.

The size specification of the half side mill depends on the depth of the half side cut that must be taken and, hence, the clearance necessary under the arbor. In this operation the 10-in. half side mills just clear the job and permit, on the other hand, the job to pass under the arbor. This is the basis for specifying the size of these mills. Primarily it revolves around the size of the job and the clearance called for; other considerations, such as chip formation, tooth entrance angle, etc., are secondary, and frequently only so much theoretical chit chat.

The cutting and clearance angle specifications are, however, extremely important just as in other types and kinds of milling passes. Here the boiler plate material calls for the use of negative cutting angles and the widest possible clearance angle selection, based on experience with this hard to machine material.

Ordinarily, this material calls for positive cutting angles, that is, a 10° positive radial rake angle and a 7° negative axial rake angle, which together with a 15° nose angle results in approximately an 8° positive true rake angle.

However, and this is significant, cutting angles are not critical. These angles are chosen as negative for the reason that any setup involving an arbor is not

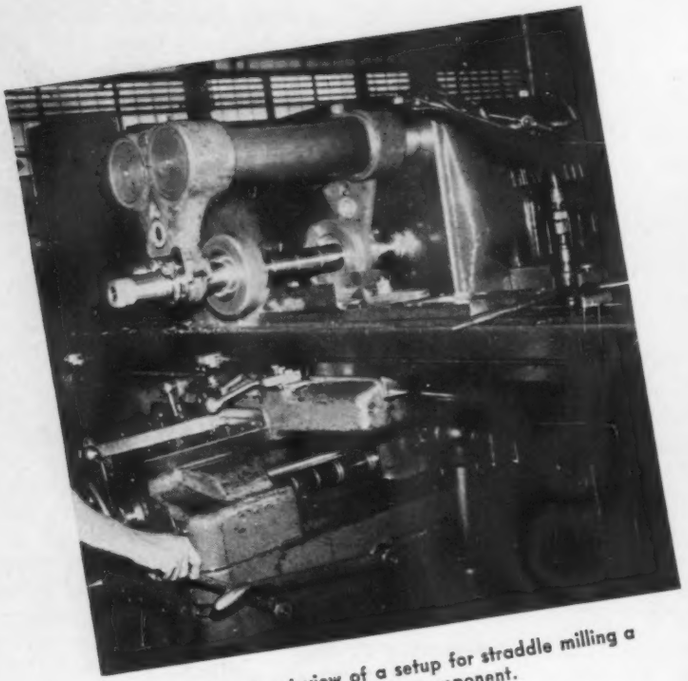
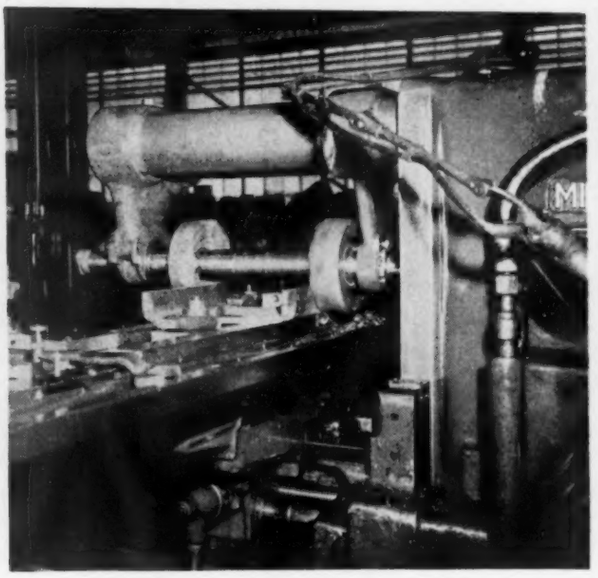


FIG. 78—Front view of a setup for straddle milling a boiler plate component.

FIG. 79—Rear view of the setup shown in fig. 78. Note the lack of an intermediate arbor support and the great amount of overhang of the outboard cutter.



rigid, or at least is not as rigid as a spindle cutter assembly, and hence some protection should be given to the carbide cutting edges.

It is extremely noteworthy that this change can be made from positive to negative cutting angles without changing the machinability other than to increase it by reducing the effect of vibration on the critical cutting edges. In other words, when the positive angles are abandoned in this job for the negative, the cutter life is increased because of a strengthening of the cutting edges against vibration that is inherent in an arbor setup. The assembly in figs. 78 and 79 can be justifiably criticized for the absence of an intermediate arbor support about half way between the two half side mills. This would have prevented the bowing of the arbor, inevitable in all assemblies of this kind.

Further, it should also be explained that the negative angles, while strengthening the cutting edge, do not throw in disadvantages such as larger cutting pressures and chip intereference. In other words, the cutting angles are not critical; changing them will not greatly change the results excepting indirectly, as here, to give better results in terms of cutter life.

But the clearance angle specification is extremely touchy: The peripheral relief must be nothing less than 7° and the face clearance angle not a half minute less than 15°. Without these the cutter life is extremely low and the whole operation has a zero ceiling.

The carbide grade should be a good slippery grade of steel cutting sintered carbide having great resistance to wear, rather than one whose forte is strength. The tensile strength of the material, and hence the cutting forces are very low; the effect on the cutting edges, therefore, is of little moment. But the wear effect of this sticky, stringy material sliding over the carbide blades or tips tends to pull out the binder or cobalt, leaving the carbide particles free and unsupported.

Determining Metal Removal Rate

The metal removal rate of a setup of this nature depends largely on the setup itself; that is, the distance between the half side mills, the size and rigidity of the machine, etc., rather than on the inherent ability of the workpiece to absorb the punishment or the machine tool to deliver the cutting pressure energy.

To judge the amount of metal that can be removed as from a workpiece shown in figs. 78 and 79 requires much experience in the ways of carbide metal removal. It was estimated, liberally, for this operation that approximately 40 cu. in. of metal could be moved each minute. This proved approximately correct as the operation was effected and the results were available for examination.

If a 40 cu. in. per min. of metal removal is specified, tentatively, then each cutter will be called on to move 20 cu in. The cut dimensions are 3 x ⅛ in., hence the sectional area of the cut is ⅜ sq in. per side, or a total of ¾ sq in. The feed rate then will be 40 ÷ ¾ or 53 ipm. As 60 ipm is the nearest dial reading, this figure will be used.

Since the sfpm rate can be anything between 600 and 900, a choice must be made. Based on experience, this is set at the highest possible surface rate for the very good reason that the lower rates do not work nearly so well in point of the all-important life.

At 900 sfpm the rpm for a 10-in. cutter is 344. Hence the chip load is 60 ÷ 10 ÷ 344, or approx. 0.0174 in. This is an entirely satisfactory tooth load and will be permitted to stand.

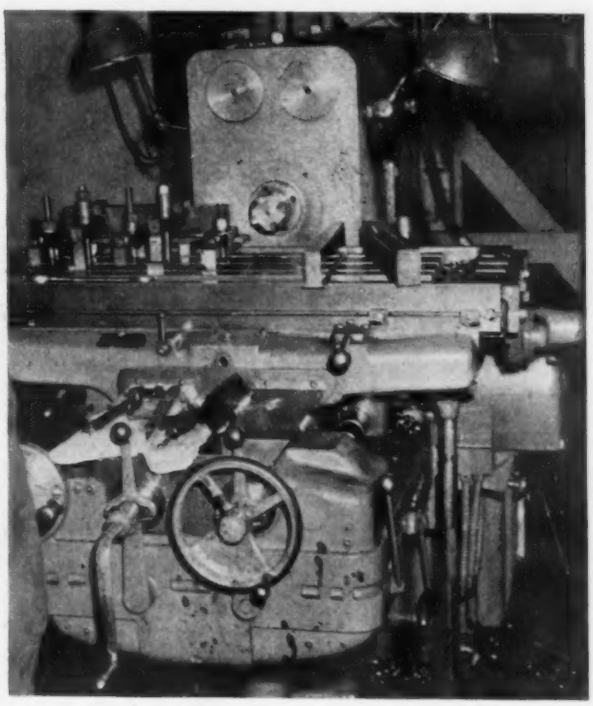
The specification of the method of milling is import-

ant in this operation: The method of milling must be climb and not conventional. First, with this method of milling, the cutting pressures are down where they should be and not up against a few threads and air. Second, the tooth angle entrance is optimum and results in a heavy section of chip being bitten off at the beginning of the cut, which is an advantage in carbide use. This presupposes, of course, that the milling machine is capable of climb milling, which means that it is equipped with climb nut adjusters or backlash eliminators.

The cutter reconditioning phase of this operation, which happens to be something of a sizable job lot, demands that the grinding department be given definite instructions to grind into the blades the angles previously specified.

In addition, the grinding department must be instructed to grind the zero line equal in length to the chip load per tooth times the number of teeth or to the feed per revolution. Here this is 0.0174 x 10, or 0.174 in. To be safe this should be specified as 0.190 in.

FIG. 80—Setup for face milling. Note that the workpiece and cutter are both held close to the face of the machine column, resulting in great rigidity and permitting very fast metal removal rates.



If so ground, then the zero line on the cutting face of the high blade will sweep over the workpiece face, and, acting like a broaching tool, will remove all the feed marks. This results in a finish of less than 20 microinches.

Based on actual results, and not on prejudices carried over from the days of other techniques and cutting materials, the life of a blade having a zero dish angle and whose zero line is equal to the feed per revolution, is excellent. In fact the cutter life is better than when a 2° dish was used and the length of the face cutting edge line was not specified.

This is an excellent operation as it is being performed, but it is advisable to compare the results attained by using a far simpler setup and abandoning what on first sight appears to be the better method.

Comparison With Face Mill

The setup for milling the same component on a horizontal machine, using a simple face mill mounted on the horizontal spindle and milling one side at a pass, is shown in fig. 80.

A comparison with figs. 78 and 79 gives at a glance the difference that should be emphasized. The simplicity of the setup, proposed as an alternate method, if not a tremendously better way of doing this job, should recommend itself to production specialists and production executives for the following reasons:

1.) The simplicity of the assembly shown in fig. 80 as compared with figs. 78 and 79, should recommend the former particularly from the standpoint of the operating personnel with which the production departments must deal. With the abandonment of the old-time apprenticeship, a milling hand is frequently nothing more or less than a lever-intelligent operator. The real functioning of a milling machine and its tremendously interesting possibilities, seldom occur to him.

(2) No two cutters assembled as those in figs. 78 and 79 ever dull equally and come up for grinding and reconditioning at the same time. This is all the more true when the cutters are set at half side mills must be set, namely, one close to the column face, the other at a considerable distance. The cutter farther away from the operator will stand up against this boiler plate a considerably longer time than the nearer one. The former is far more rigidly supported, being closer to a solid member of the machine. Yet to what avail is the longer life of the one as compared with the other? The setup must come down with the first cutter to fail, even though the other needs no attention. The downtime on the machine is determined by the weakest cutter and not by the one with the greatest longevity.

This argument holds in spite of the fact that with this design of cutter, the bodies are not removed when the cutting elements need reconditioning. The mechanically held blades only are removed, leaving the cutter bodies on the arbor. The dimensional relationship between the cutters and the workpiece, which is at best, even in skilled hands, a tedious and time-consuming operation, is difficult to establish. But once established it is not disturbed.

(3) A 4-in. diam. cutter can be used as a face mill to perform this operation, although a 6-in. is probably the better selection. If this size face mill is selected, note that the amount of carbide is 6 blades to 20 and while this is a considerable difference in the initial expense of the setup, the big point is the difference in the reconditioning time, cost and effort.

(4) The operation will be far more ideal in its results with a 6-in. face mill than with two 10-in. half side mills. The half side nearer the operator is subject to the temperamental displays of all arbors operating under conditions as indicated.

(5) Finally, it may be well to investigate whether there is possible a considerable saving in time, using a face mill in place of the half sides as shown. The setup for the former is similar to that shown in fig.

Previous articles in this series covering carbide milling were as follows:

Part No.	*Subject*	*Issue Date*
1.	Fundamentals of carbide milling.	Feb. 13, 1947
2.	Low carbon steel and wrought iron.	Feb. 20, 1947
3.	Straight carbon and cast steel.	Feb. 27, 1947
4.	Heat-treated steels.	Mar. 6, 1947
5.	Armor plate, heat-treated alloy steel, stress proof steel, die plates.	Mar. 13, 1947
6.	Stainless steels.	Mar. 20, 1947
7.	Semisteel, Ni-Resist, alloy cast iron.	Mar. 27, 1947
8.	Factors governing cutter life, selecting feed rates.	Apr. 10, 1947
9.	Regulating life between grinds, cutter design.	Apr. 17, 1947
10.	Factors involved in good practice.	Apr. 24, 1947
11.	Tool grinding, reconditioning and blade setting.	May 8, 1947
12.	Converting to carbide milling.	May 15, 1947
13.	Planning carbide milling operations.	May 22, 1947
14.	Analyzing the workpiece establishing feed rates.	June 5, 1947
15.	Rating carbide milling jobs.	June 12, 1947
16.	Rating carbide milling jobs (continued), selecting cutter size.	June 19, 1947

80, although this is not the locomotive component being milled in figs. 78 and 79.

Checking Time Saving

The feed rate with the half side mills is 60 ipm. This is possible since the amount of metal removed in the cross-section is relatively small, ¾ sq in. total.

If a 6-in. face mill is used, what are the possibilities of using a faster rate? The cut dimensions are 3 x ⅛ in. or ⅜ sq in. If the metal removal rate is set at 33 cu in. per min. instead of 22½ on one side for the half side mills, then the feed rate will be 90 ipm approx. Since this is the highest feed rate available on the latest equipment, it would be impossible to set a higher removal rate. At 90 ipm the chip load is equal to 90 ÷ 6 ÷ 600 rpm approx. (for a sfpm rate of 900) or 0.025 in. This is an ideal chip load and is therefore expected to give better results than the 0.0174 in. load for the half side mill operation.

The cutting time for a 20-in. long workpiece is: For the half side mills, 20 in. + 10 in. ÷ 60, or ½ min. For the 6-in. face mill setup it is: 20 in. + 6 in. ÷ 90, or 17 sec. The time to consummate a setup of half side mills is 1½ hr.; of a 6-in. face mill 15 min. Downtime for the machine when cutter reconditioning time rolls around is 15 min for the face mill and 45 min for the half side mill. Time to regrind six blades for the face mill is 12 min and 40 min for the half side.

In a test setup using a 20 hp machine designed specifically for carbide operation, and which is about the size of a No. 2 standard milling machine, or slightly larger, the actual floor-to-floor time per piece with a face mill is 1 min using a magnetic chuck.

For the half side setup the best time, taken over 500 pieces, is 1½ min which takes into account the longer time for handling between cuts and the longer downtime of the machine between grinds.

In addition, the face mill setup has all the advantages of lower first cost for the conversion to carbide; less difficulty with the personnel; less grinding cost and better results in points of finish and accuracy. The latter, however, are not of moment in the specifications of this component.

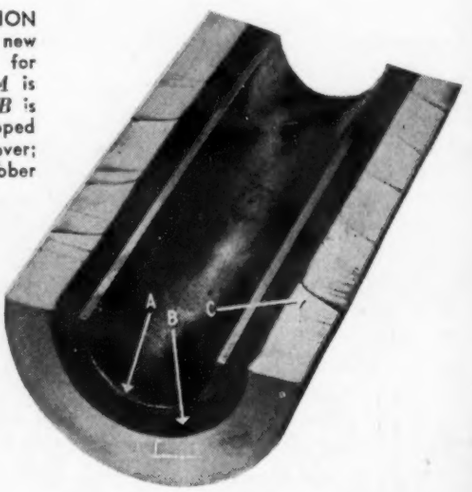
A complete test run involving the determination of carbide and carbide grinding costs per piece with the half side mill technique and the face mill would undoubtedly yield more arguments for the simpler setup.

Part 18 of this series on carbide milling will appear in the next issue.—Ed.

Improved Hold-Down Roll for Pickling

ALMOST complete resistance to damage from cuts is reported for a new roll for steel-mill pickling lines developed by Goodyear Tire & Rubber Co. This roll, shown in the accompanying illustration, utilizes an inner cover of especially developed fibrous material which protects the steel core from contact with acid. Known as the Goodyear special hold-down and carrying roll, the new roll continues to utilize a high grade synthetic rubber cover on the weight-carrying surface. This outer cover is unaffected by acids. Until development of the new fibrous material, which is bonded by a special process to the steel core, cuts in the rubber surfaces of pickling tank rolls often permitted acid to reach the core and destroy it, according to Goodyear. This fibrous material is said to be sufficiently hard to absorb the shock of practically all cuts to which pickling tank rolls are subjected, while remaining immune itself to damage from acid seeping through the gash.

The roll's synthetic rubber surface is bonded in turn to the fibrous material. A newly-developed bonding process assures tight adhesion of the fibrous material to the roll core and cover for the roll's life. Regardless of the diameter of each of the new-type rolls the protective fibrous material is applied to each core in a 0.25-in. layer. Similarly, the rubber weight-carrying surfaces of the rolls will remain about 0.75 in.



CROSS-SECTION view of the new hold-down roll for pickling lines. *A* is the steel core, *B* is a newly developed fibrous inner cover; *C* is outer rubber surface.

Controlling Casting Quality With a Dilatometer

o o o

By CARL M. KING
Harry W. Dietert Co., Detroit

o o o

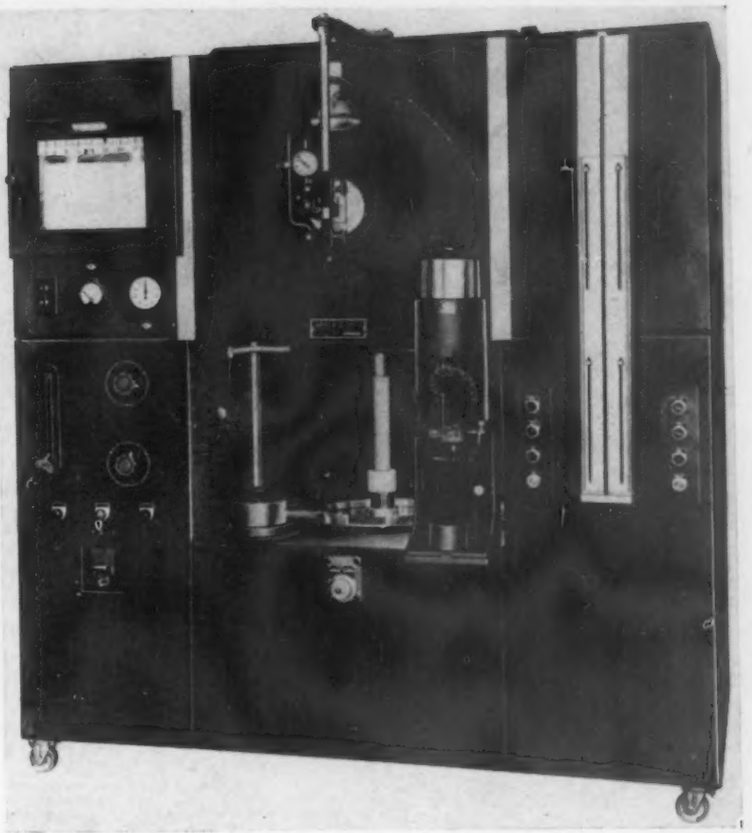


FIG. 1—General view of a Dilatometer for analyzing the behavior of sand mixtures.

A FEW years ago examination of molding sand mixtures for foundry castings was confined to the use of test data obtained at room temperatures. Casting defects were a matter of chance. Today, however, the use of the Dilatometer makes it possible for the foundryman to maintain absolute quality control over all castings and, as a result, minimize such casting defects as rat tails, hot tears, fissures, blows, and buckles.

The physical and chemical properties of the molding material at pouring temperatures are indicative of the mold condition at the time the casting is being formed. Analysis of the physical and chemical properties of the mold mixture requires the control of temperature and the indication of time and temperature. Both time and temperature have a direct and important bearing on the number and rate of chemical reactions the mold undergoes, as well as on its physical condition.

Casting defects come from a break down of the sand mold surface. The mold is subjected to great thermal shock when liquid metal is poured into it. In order to eliminate casting defects, the properties of the sand mold at elevated temperatures must be controlled. The strength of the sand at 500°, 1000° and 1500°F indicates its ability to withstand the erosive effects of liquid metal. Dirty castings with rough surfaces are made when sand is eroded in the mold surface. To eliminate dirty castings, it is necessary to increase the strength of sand at temperatures from 500° to 1500°F.

If the sand is too strong it will, upon heating, expand and buckle or crack. When the sand does this, rat tails, scabs and buckles are produced on the casting. In order to eliminate these defects, hot strength at 2000°F is reduced. A suitable range for boiler and radiator castings is 30 to 60 lb at 2000°F.

The finish of steel castings is closely related to the hot strength of sand at 2500°F. If the hot strength at 2500°F is below 5 psi, the castings will be rough and contain sand inclusions. If the hot strength at 2500°F is between 5 and 15 lb, the sand will usually peel away clean from the casting surface, leaving a smooth finish casting. If the hot strength at 2500°F exceeds 15 lb on light castings, the sand will be rigid enough to prevent this casting from contracting and will cause tears.

There are some points in the steel mold over which a great volume of metal flows. In order to keep the sand from washing away, it is necessary to develop a hot strength at 2500°F in excess of 25 lb psi. This high hot strength sand is used only at certain points. It would be too strong for the whole mold.

Control of molding mixtures and materials by their analysis at pouring temperatures is facilitated by the use of a Dilatometer. The Dilatometer, Fig. 1, derives its name from the fact that it was originally used to measure the expansion of sands used for molds. Developments and improvements have brought the instrument to a point where it can be used to analyze completely the behavior of a sample mold mixture at the metal pouring temperature. Fig. 2 shows

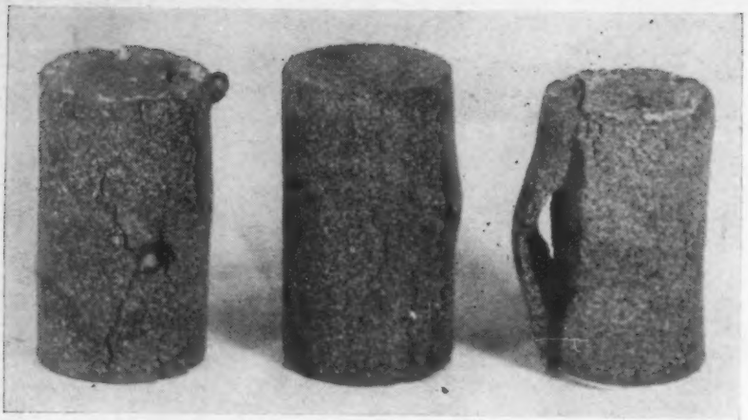


FIG. 2—Sand specimens showing results of testing with a Dilatometer.

several sand specimens after testing in the Dilatometer.

The Dilatometer furnace and accessories which form the complete testing unit are encased in a steel cabinet. The furnace has an inside usable hearth of 4½ in. diam and 11 in. long which accommodates test molds of 1 to 2 in. diam and up to 4 in. in length. The furnace is electrically heated and operates from a temperature of 400°F to slightly above 3000°F. The fast control desired is provided by a Brown ElectroniK recording potentiometer with two normally closed contacts. The record of temperature and elapsed time indicates to the operator the exact conditions existing within the furnace at any given time. An electric timer is provided for the timing of all tests.

The test specimen is placed under a compression load by the oil pressure from an electric motor driven oil pump. The volume of oil delivered by the pump is regulated by an adjustable oil volume controller so as to provide for loading the specimen at various rates of table travel. The load on the test specimen is measured in pounds per square inch by a sensitive pressure gage. The specimen is raised into the test position within the furnace either by hand, as in the case of the smaller model Dilatometer, or by means of an oil-operated loading piston, as in the case of the larger models.

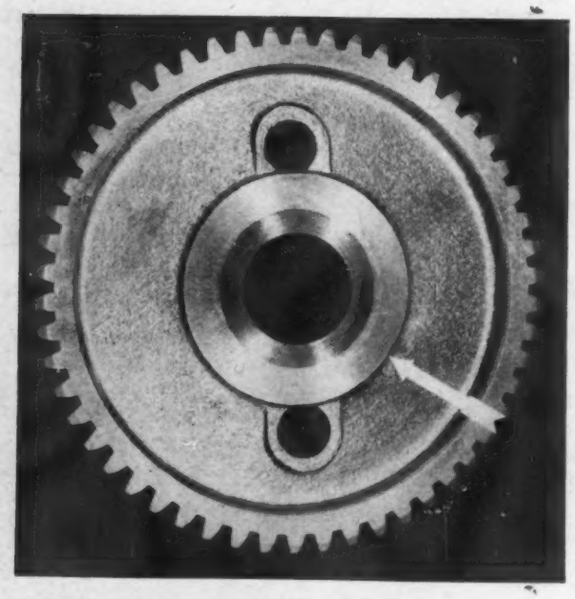
Test specimens can be observed under various test conditions through the sliding pyrex glass observation port which is provided. Such mold defects as hot spalling, protective coat spalling, hot expansion, deformation, strength, etc. are readily revealed.

Aluminum Timing Gears Made by Al-Fin Process

ACCORDED wide recognition during the war as an entirely new method of bonding aluminum cooling fins to aircraft engine cylinder barrels, the Al-Fin process has now been applied to the manufacture of timing gears for automotive use.

Recently announced by Al-Fin Corp., subsidiary of Fairchild Engine & Airplane Corp., the new process is claimed to produce gears substantially stronger than the molded resin-and-fiber gears commonly used in automobile engines. They are said to have much longer life because of the better wearing qualities of aluminum, and to operate as quietly as the molded resin type.

IG. 1—New type of aluminum timing gear with bonded-in steel hub. The arrow points to the Al-Fin chemical bond between the aluminum and the steel.



The gears shown in fig. 1, are composed of aluminum alloys chemically bonded to steel hubs which gives the bond a tensile strength of 6000 psi, and are expected to be especially suitable for heavy-duty use, as in truck and bus engines. Some of these have been operated over 100,000 miles without failure, it is reported, and attempts to rupture the bond by pressing the hub through the gear have been unsuccessful, even at pressures of 98,000 lb.

The patented Al-Fin process of chemically bonding aluminum and its alloys to iron and steel is a development which permits the fabrication of bimetallic assemblies combining selected physical properties of both metals, and facilitates the production of units requiring the strength of steel with the characteristics of aluminum, such as light weight, high heat conductivity, excellent bearing properties and anticorrosive qualities entirely superior to those of steel.

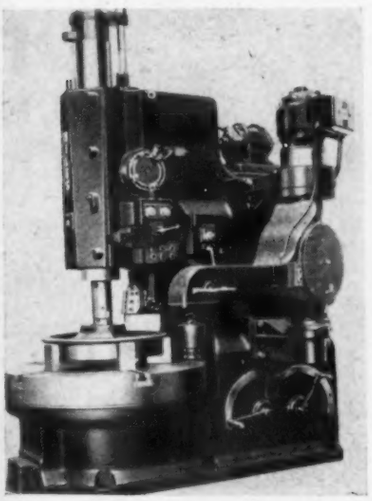
Al-Fin sleeve bearings and bushings are also available to give the bearing qualities of aluminum coupled with the strength, resilience and fatigue resistance of steel, and are said to be especially suitable for heavy-duty applications such as are found in diesel engines. The materials usually used for the bearing linings are Alcoa 750, XA-750, and pure aluminum with 6 pct tin.

New Equipment . . .

A hydraulic wheel borer, high-speed arc welders and press type spot and projection welders, a portable hydraulic shear, tapping attachments, indexing type boring heads, and work holding fixtures are described herein, together with various plant service items such as an electric lift truck, tote pan lifter, rubber-covered separators and ball type universal joints.

Hydraulic Wheel Borer

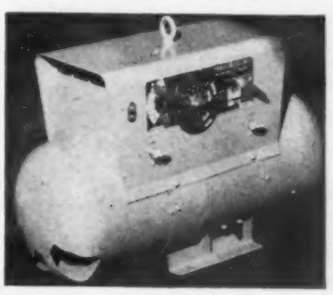
IN a five-step automatic cycle, the Niles 48-in. hydraulic wheel borer roughs, finish machines, chamfers the bore, and faces the hub of cast iron or steel wheels, according to the manufacturer, *General Machinery Corp.*, Hamilton, Ohio. After feed dials have been set for the desired operation, it is necessary to operate only three separate controls to bore individual wheels. Feed selections within the



range of the machine make it possible to select the most efficient feed for a particular speed and material. The wheel is automatically chucked by pushing one button of the controls. Another button starts the table and a lever when pushed down starts the boring cycle.

High-Speed Arc Welder

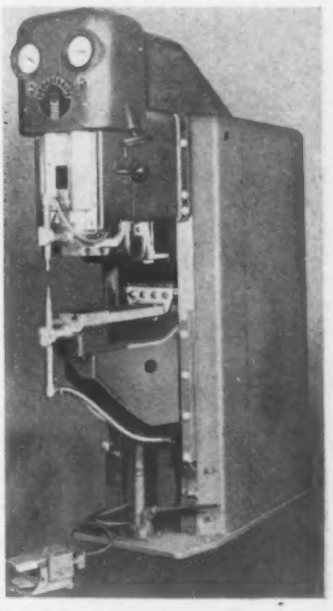
A LINE of single-operator high speed dc arc welding machines, type WD-40, has been designed for savings in size and weight and improved welding characteristics, *General Electric Co.*, Schenectady 5, announces. Operating at 3500 rpm, the new welders are available in 200, 300 and 400-amp models. The arc is easily established and maintained, it is said, because full arc voltage is generated instantly after short circuit. Excessive weld spatter is reduced because current peaks are adjusted for best performance on any setting. A single-dial, dual-range control combines



flexibility and precision of dual control. The correct current for any given job can be present without having to make other adjustments after the arc is struck. A tap switch handle in the form of a pointer, set to the electrode size being used, automatically points out the proper one of several graduated scales on the face of the current-setting dial. This indicates the current range which should be used and permits precise adjustment of the welder output. The standard assembly includes a stationary welding generator, driving motor, control cabinet and panel and a motor starter assembled into a single, compact unit.

Press Type Welders

A LINE of improved roller-head, press type spot and projection welders, ranging from 50 to 500 kva capacity has been announced by *Progressive Welder Co.*, 3050 E. Outer Dr., Detroit 12. They are said to be equally adapted to continuous high production runs and to handling of various types and sizes of work on a job-lot run basis, a combination achieved by the arrangement of knees, welding arms, platens, electrode holders, etc. Provision can be made for pulsation welding, resistance upsetting and resistance brazing; also for preheating, postheating or tempering of the work while still in the machine. Frames are designed in two sections, the forward section which takes all the high stresses incident to resistance welding with high pressures is of massive construction; the rear section is of



relatively lightweight construction. Machine operation is obtained through either air or hydraulic actuation, on all sizes up to 250 kva. On larger machines, hydraulic operation is standard. All machine sizes are available with throat depths of 18, 24 or 30 in. for projection welding, 18 to 36 in. for spot welding.

Spot Welders

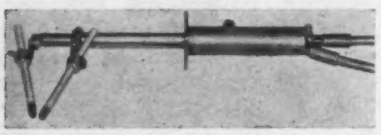
A PRESS action type spot welder, Model 752-P, and a rocker arm type, Model 752-R, have been introduced by *Weldex, Inc.*, 7344 McDonald Ave., Detroit 10.

Both are described as high-speed, fully automatic, air-operated, light-gage metal resistance welders. They have a built-in transformer, tap changing switch, solenoid air valve, single-acting air cylinder, adjustable air-operated pilot switch, and magnetic contactor. An electronic timer automatically controls all phases of the welding cycle. Stand-

ard equipment includes adjustable air pressure regulator, pressure gage, and a push button footswitch. Electrode holders and special alloy welding tips are water-cooled. Special arms, electrodes, and small platens for light projection welding are available as accessories.

Arc Torch

MANY welding and brazing operations for which a very soft flame is the most suitable source of heat, can be done by the double-carbon arc process, using the arc torch announced by *C. E. Phillips & Co.*, 2750 Poplar St., Detroit 8. Current conducting members of the torch are two concentric metal tubes, one sliding within the other and insulated by a fiber



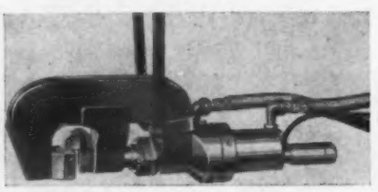
sleeve, thus automatically maintaining alignment for all adjustments of arc gap width. A control button is located in the fiber handle and weight is distributed, it is said, to give good balance and maximum ease of operation. The torch can be used with all types of arcwelding machines, ac or dc, and is furnished with both bayonet type and lug type terminal connectors. It will accommodate electrodes from ¼ to ⅜ in. diam without changing holders or using adapters.

Multiflame Brazing Tips

THE addition of three new multiflame brazing tips to their welding apparatus line has been announced by *Air Reduction Co.*, 60 E. 42nd St., New York 17. These tips are recommended for silver brazing and high temperature brazing and are said to operate satisfactorily with various gas combinations such as oxyacetylene, oxyhydrogen, oxycity, or natural gas. Because of the low velocity of heat and the large areas covered by the flame, the correct heat pattern is said to be reached quickly. The tips have been designed to assure even heating throughout a joint area, decreased operator fatigue and to speed up brazing operations. They are said to be suited also for depositing hard-facing alloys.

Hydraulic Shear

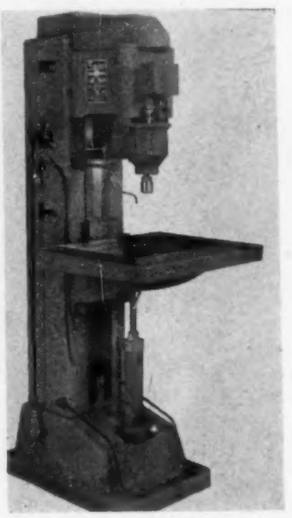
DEVELOPMENT of a special type portable hydraulic shear has been announced by *Hannifin Corp.*, 1101 S. Kilbourn Ave., Chicago, for production cutting of assembled parts that cannot be placed in a power saw or otherwise held securely for cutting. The shear, illustrated, is capable of exerting a



12½-ton force. Models are available in capacities up to 100 tons with special yokes and built-in guides for squaring up with work before cutting. Control is by a push button on the shear which is connected to a hydraulic pressure generator.

Air Tool

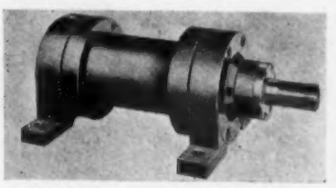
A BASIC air tool, fundamental in drilling, threading and tapping operations, has been produced by the *Snow Mfg. Co.*, 615 S. California Ave., Chicago 12. The machine is air-operated, electrically-controlled, and functions at the touch of a button. Around this basic tool are built a drill press, a threading machine, and a universal tapping machine. The drill press is available in two sizes, with rated capacities in mild steel up to ¼ in. for Type 1-UD, and ⅛ to ⅜ in. for Type 2-UD. It provides infinite



feed, split-second drill control, it is said, and automatic withdrawal of drill. The threading machine in sizes No. 3 and 4, is said to thread true to lead and thread form, and to give a fine finish at high threading speeds. The universal tapping machine comes in four sizes. The air tool features air-operated table raising and lowering unit, wide bale-type foot lever and cast aluminum air head.

Oil Hydraulic Cylinders

AN improved line of oil hydraulic cylinders has been announced by *Lindberg Engineering Co.*, 2444 W. Hubbard St., Chicago 12. Ports can be repositioned for particular



applications, a feature permitting simplified piping. Caps, flanges, cylinder tubes, piston rods and C rings are made of steel to reduce breakage. Pistons are aluminum alloy. Neoprene rings replace conventional gaskets and sealing action is automatic, increasing as pressure increases. Screw heads

are accessible from outside the cylinder. C-ring construction eliminates necessity of tie-rods and reduces installation space required.

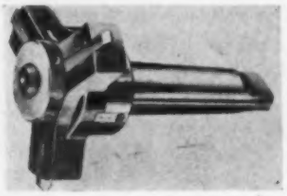
Tapping Attachment

CALLED the Torqomatic, an adaptable torque-driven tapping attachment has been announced

by the *Charles L. Jarvis Co.*, Middletown, Conn. This ultra-sensitive unit will tap from soap to copper or chrome nickel steel without an appreciable increase of the finger-tip pressure required to operate an ordinary drill press, it is claimed. Torqomatics come in standard and built-in models and can be furnished to fit any drill press or tapping machine. They are available in three sizes.

Indexing Type Boring Head

BUILT for repetitive boring operations in lots as small as three pieces, the Kwik-Size boring tool is manufactured by the *Kaukauna Machine Corp.*, Kaukauna, Wis. Without changing cutter bits, it is possible to rough, semi-finish and finish bore. To accomplish this the boring head which is mounted on an eccentric arbor is indexed for individual cuts. Uniformity or bore size is assured as the boring head is firmly locked in accurate position after each indexing. The tool has been developed for stub bar boring only and is said to be especially adapted for rapid standard or heavy duty precision work. Either carbide cutting tools or high-speed steel bits may be used. The head is designed to provide ample metal backing for the cutting tools to prevent vibration and chatter. Hole sizes from 4 to 8⅛ in. diam may be bored.

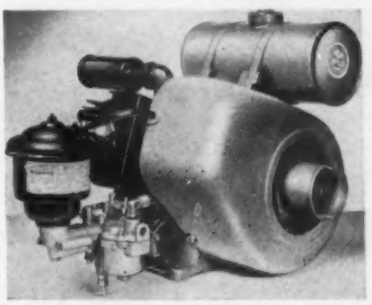


High-Speed Mills

HIGH-SPEED 3/32 in. shank mills available in 10 popular shapes and 6 sizes for use in the manufacture of small intricate parts, diecastings, dies and molds, have been announced by *Severance Tool Industries, Inc.*, 742 Iowa St., Saginaw, Mich. Mills are 1⅝ in. in overall length and are available with cutting head diameters from 1/16 to 5/16 in., in 1/32 in. steps.

Air-Cooled Motor

A 1½ hp single cylinder, air-cooled engine suitable for walking-type tractors, pumps, small construction equipment, compressors and general utility equipment is produced by the *Continental Motors Corp.*, Detroit. Known as the AA7 model, the new Continental is a 4-cycle, L-head unit, cooled by a blower type flywheel which is shrouded to force air over the large cooling fins on the cylinder and head. The motor is rated at 1½ shaft hp at 2400 rpm. Bore is 2⅛ in., stroke is 2 in. and piston displacement is 7 1/10 cu in.

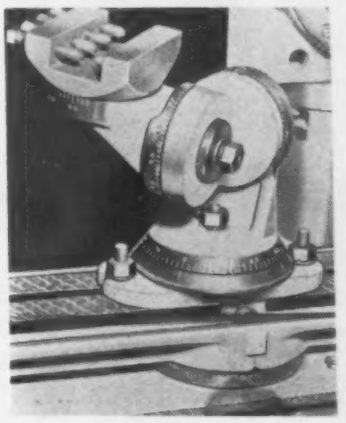


Abrasive Points

SIXTEEN of the most popular sizes and shapes of mounted points have been included in the No. 16 mounted point assortment kit introduced by the *Norton Co.*, Worcester, Mass. They are packaged in a box which also serves as a holder. The points are made of 38 Alundum abrasive, vitrified bonded and cemented on steel spindles. The kit is especially suitable for tool and die makers who require a variety of shapes and sizes.

Work Holding Fixture

A UNIVERSAL work holding fixture, for grinding all types of lathe tools, which has four graduated quadrants said to permit fast, accurate setting of any simple



or compound angle has been introduced by the *K. O. Lee Co.*, Aberdeen, S. Dakota. The fixture is equipped with a 1½-in. vise and can be furnished to fit practically any make of cutter or surface grinder.

Slotting Cutter

BI-AXIAL, carbide tipped milling cutters have been developed by *Super Tool Co.*, 21650 Hoover Rd., Detroit 13, for slotting steel. Two axial rake angles and negative rake on the blade account for automatic centering and absence of flutter. This is said to eliminate

side wear and make possible holding of close tolerances as well as increasing the number of cuts per grind.

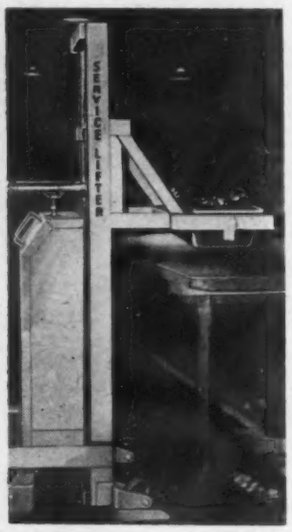
Soluble Oil

CALLED Kelco Protectal and said to give good protection against rust, a new soluble oil has

been made by the *J. W. Kelley Co.*, 3401 W. 140th St., Cleveland 11. When cut back with 50 to 60 parts of water the oil can be used on gray or malleable iron, and on grinding or cutting steel it can be cut back with 70 to 90 parts of water. It is reported that better finish on aluminum and other nonferrous metals can be obtained when they are ground with this emulsion. New germicides protect the operators, and the oil remains stable and odorless over a long period of time.

Tote Pan Lifter

HANDLING of tote pans can be accomplished with speed, safety and ease, it is said, with the service tote pan lifter manufac-



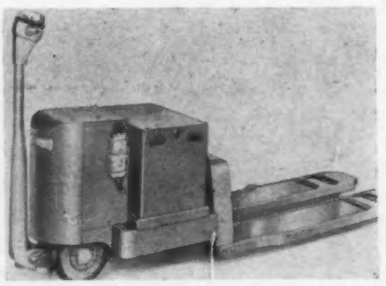
tured by *Service Caster & Truck Corp.*, Albion, Mich. Controlled by a push button on the handle, and powered with two standard 6 v batteries, the lifter has a capacity of 150 lb. Overall height is 5 ft 9 in. Lifting height is 54 in.

Safety Cans

AVAILABLE in 1, 3 and 5-gal sizes, a new line of safety containers announced by *General Detroit Corp.*, 2272 E. Jefferson Ave., Detroit 7, are designed for storage of inflammable and volatile liquids. The containers are constructed of terne plate, lead-coated inside and out, and are finished in red enamel. The pouring spout is of nonsparking diecast brass and if tipped over, leakage is said to be held to a minimum according to Underwriters' specifications. Special features include a covered spring to prevent accumulation of dirt and a spout opening to a full 180° angle. A flame arrester consisting of a double screen of cadmium-coated steel is optional.

Electric Lift Truck

THE model K hydroelectric motorized lift truck manufactured by *Lift Trucks, Inc.*, 2425 Spring Grove Ave., Cincinnati 14, has been announced as available in



pallet and platform styles with a capacity of 4000 lb. The truck has two speeds in both forward and reverse, dynamic braking and a two-wheel front drive. To simplify maintenance, the entire motor, drive and controller can be removed from the frame. Speeds and brake action are controlled by three push buttons contained in the steering handle. Platform models are furnished in 20 and 26¾-in. wide, 36 to 72-in. long platforms, all with 3½-in. lift from 6 to 11-in. standard heights. Pallet models are 24 and 27 in. wide, 30 to 60 in. long with 4-in. lift from 3½ in. in lowered position.

Pipe Strainer

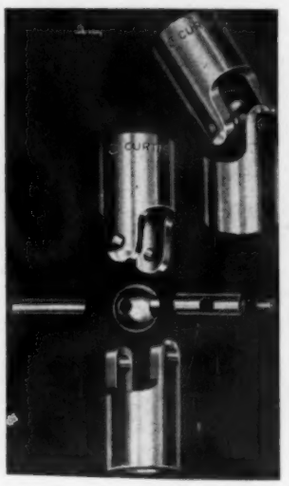
AVAILABLE in pipe sizes from ⅛ through 2 in. a Y type strainer has been announced by *A. W. Cash Valve Mfg. Corp.*, Decatur 60, Ill. These strainers are made of cadmium-plated rust-resisting cast iron or all bronze construction. They are built around 250 lb standards for cast iron and are suitable for 400-lb service when furnished in bronze.

Curved-Tooth File

KNOWN as the Vixen Wizcut file, an improved curved-tooth file has been announced by the *Heller Bros. Co.*, Newark, N. J. Serpentine-like chip-breaking grooves superimposed on the curved contour of the milled teeth provide a special selfclearing or non-clogging feature. Such design is said to avoid loading even when working with soft metals. The Vixen Wizcut is said to cut with a genuine shearing action, regardless of whether the file is pushed straight ahead or at an angle.

Ball Type Universal Joint

DEVELOPMENT of a ball type industrial universal joint which is said to eliminate sliding friction and minimize bearing friction, making excessive lubrication unnecessary, has been announced by *Curtis Universal Joint Co., Inc.*, Birnie Ave., Springfield 7, Mass. The forks of this ball-type joint are steel and bear on a bronze ball, with heat-

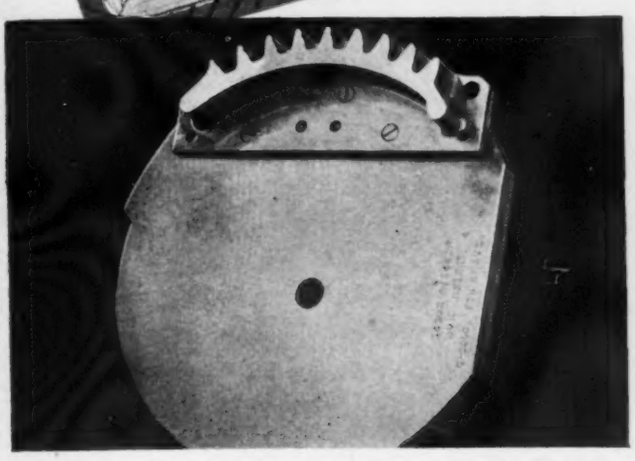


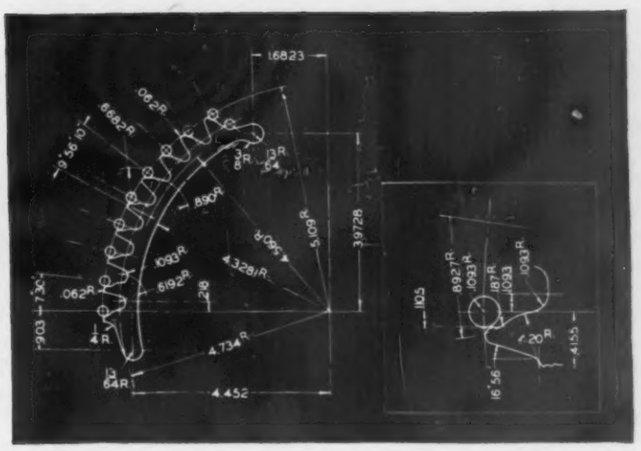
treated centerless ground pivot bearing pins. Large pivot pin is provided with an oiler that enables proper lubrication to reach all bearing points. Two sizes are available, ½ and ¾ in. diam.

Rubber-Covered Separators

RUBBER-COVERED woven wire screen and expanded or perforated metal available in a variety of mesh sizes have been announced by *Automotive Rubber Co., Inc.*, 8605 Epworth Blvd., Detroit 4, for handling plated, painted or precision finished parts without scratching or marring. Any size separators can be furnished to fit bottoms of tote pans, conveyor baskets or pallets. Coatings are available in hard, semihard or soft natural rubber or synthetic rubber to meet specific requirements. When used for palletizing and stacking parts, tipping and skidding of tiers is said to be materially reduced.

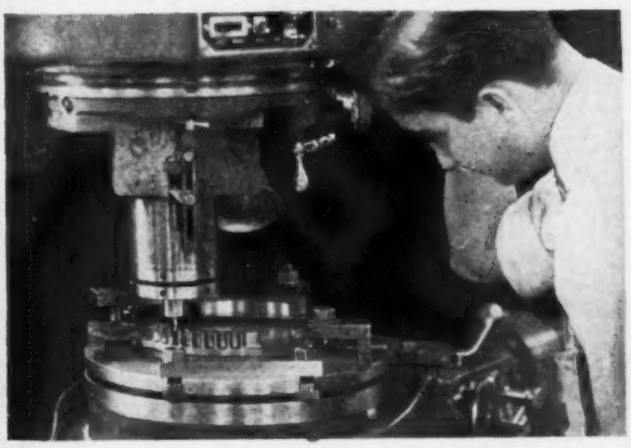
How to Mill this Shave Punch Complete in 60 Hours





1 **FAST!** 6 hours for layout and setup. 25 hours rough cut. 29 hours finish cut. Material: High carbon, high chrome steel. Total: 60 hours blank stock to finished shave punch. That's typical 2D Rotary Head Milling Machine performance.

2 **DIRECT!** Intricate shapes of punch teeth milled direct in workpiece. No fussing with models or templets. Blueprint was the only guide the operator had or needed. Precision control of all combinations of cutting movements did the rest.



3 **ACCURATE!** Single setup held chance of error to minimum. Operator relied on built-in precision, control and measuring devices — had no difficulty holding tolerance to $+.0005'' - .0000''$.

Photos and information Courtesy of National Cash Register Co.

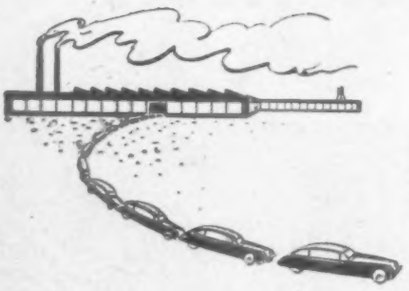
KEARNEY & TRECKER CORPORATION
MILWAUKEE 14, WISCONSIN

4 For the Whole Story of how you can get the benefits of *Fast, Direct, Accurate* results on tough intricate jobs using the Model 2D Rotary Head Milling Machine—send for bulletin 1002C.

Assembly Line . . .

WALTER G. PATTON

• Chevrolet assembly plant shows the way for postwar motor car production . . . Flexibility is being built into the new assembly lines.



DETROIT — Automobile production techniques don't stand still even though car models may remain unchanged.

This fact was driven home with emphasis this week when the press was invited to inspect Chevrolet's new assembly plant at Flint.

Students of the assembly line production method are finding plenty to talk about as a result of the many innovations introduced by Fisher and Chevrolet at their first postwar assembly plant.

Among the new practices introduced at the new plant is "suspended assembly" in which the chassis hangs from an overhead monorail-type conveyer instead of being carried on a floor-type conveyer. This brings the work to the employee at bench level and gives access to the chassis from all sides. It also permits right-side-up assembly of the chassis and avoids the costly and involved operation of turning the chassis over before lowering the body into place. The latter practice is used today in other auto assembly plants.

Of considerable interest to steel suppliers is the fact that Chevrolet is assembling its own frames at Flint, being the only manufacturer to adopt this practice. Frame side rails are purchased from outside sources and fabrication consisting of welding and riveting is performed at the Flint plant. Chevrolet engineers explained that a large volume producer like Chevrolet can make a substantial saving in shipping costs where the side rails are packed together and shipped as rails rather than as assembled frames.

Other unique features of the new Flint plant include shielded paint spray booths where the operators are able to work without masks (some wear a white shirt), the use of a unique elevator device to bring the conveyer carrier into position and to lift the empty carrier to the return line, and the use of so-called "split" line and "power-and-free" conveyers.

Good working conditions have been stressed in the Fisher-Chevrolet layout. Ceilings are high and illumination is provided by 7 miles of fluorescent lighting tubes. In the trim department artificial lighting is rated at 80-ft candles compared with 10-ft candles for a normal home and 15-20 ft candles for a drafting room.

Particularly in the paint departments, working conditions appear to be greatly improved over older plants. The presence of paint fumes in spray booths has been reduced at some points by the use of forced air ventilation and water curtains under a metal grille which constitutes the floor. In addition, ventilating systems have been installed in the welding and soldering areas.

THE "switch" in the final assembly line is a plant layout feature that is unique with Chevrolet's new Flint plant. Here two conveyer lines progress from dual body drop operations. A single chassis line supplies both these lines. The more meticulous and time-consuming work to be done after the body is mounted on the chassis is performed, therefore, with the line moving at half the speed of the chassis line. Previous assembly line practice has been to install perhaps twice as many workers to take care of the extra time requirements for the final assembly operations.

Another innovation in the new Chevrolet plant is a "power-and-free" conveyer system employed at several points along the line. In its power phase, the power chain for the conveyer system makes contact with and moves the carrier. In the free phase, the power chain loops away from the conveyer and permits the work to be moved by hand. This is another example of building flexibility into assembly line operations since the worker can pace the rate of flow at this point along the line.

Comprising about 29 acres of car and truck assembly area, the new Chevrolet plant will produce a new car every minute and a new truck every 3 min or 80 vehicles per hr. Approximately 3500 employees have now been trained and the plant has been operating a little more than a month. The first body was completed and shipped to Chevrolet on Apr. 23, 1947.

The new Fisher plant is built on three levels: Cafeteria, lockers, washrooms, vault and control rooms are on the lower level; body shop and trim shop are on the first floor, and paint shop and cushion room are on the second floor.

The adjacent Chevrolet assembly building has a center main assembly bay 60 ft wide and 60 ft high; dimensions are 1001 x 663 ft. The second floor or balcony surrounds the main assembly bay and is devoted to the truck cab building and paint shop. Final passenger car and truck assembly lines run parallel the length of the building.

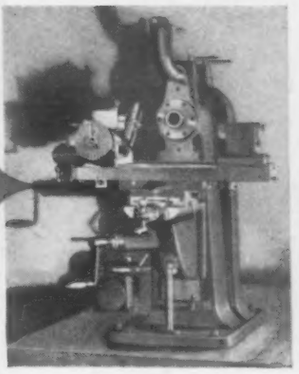
The new Fisher-Chevrolet layout stresses good working conditions throughout. Ventilation and lighting is outstanding, and there is no indication of rushing the work at any point along the line. Despite the fact that the plant has been in operation only a little more than a month, this observer did not see unfilled hooks or tieups anywhere along the line, sure indication that most of the kinks have been ironed out of the new operation.

Fisher and Chevrolet engineers estimate that at least another month will be required to make final adjustments in plant operations but there is every indication

Paired for PRECISION

◀ P&W BENCH LATHE

P&W BENCH MILLER ▶

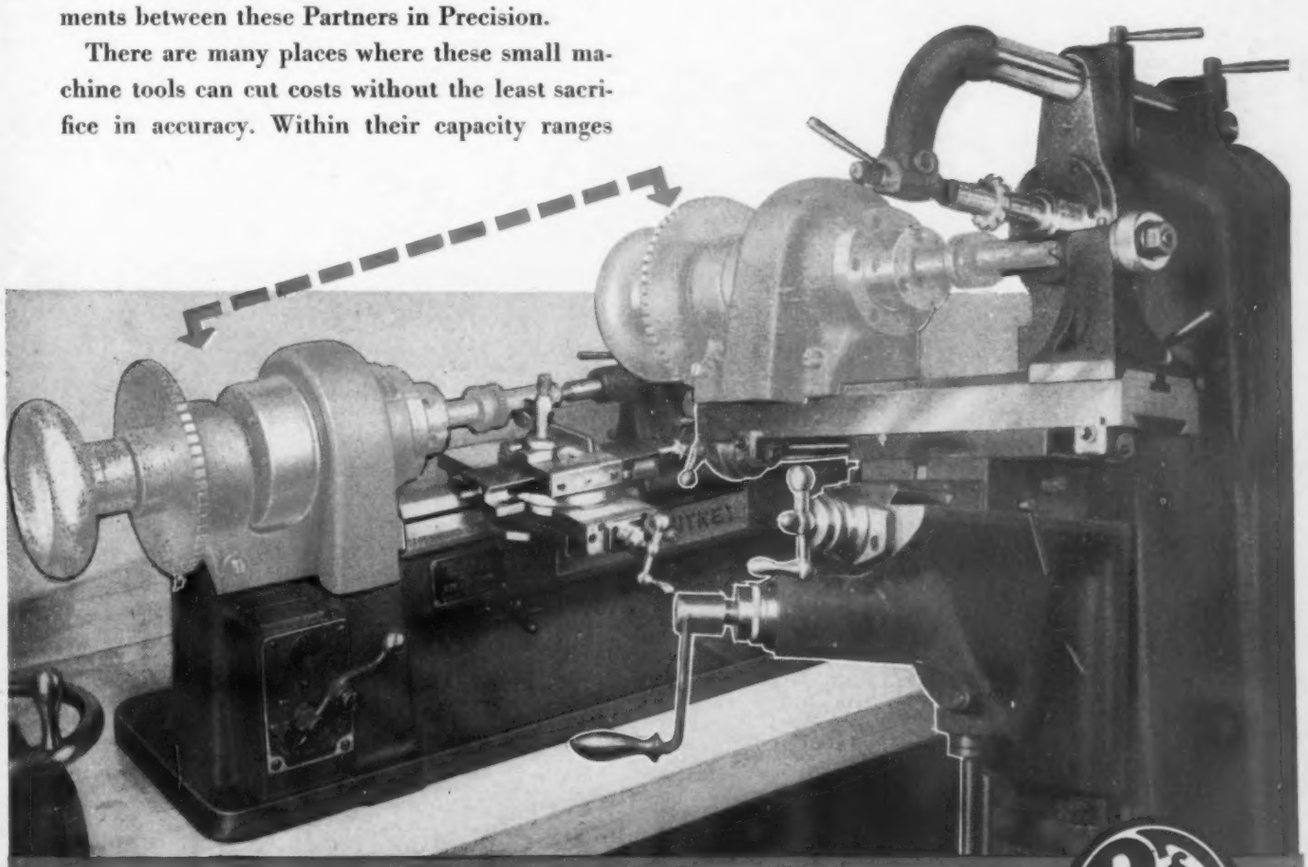


Shown below is an example of the precision possibilities of these P&W Bench Machines. After preliminary turning operations the entire Bench Lathe headstock was transferred to the Bench Miller *without disturbing the work setup.* Milling was completed and the job returned to the lathe for further turning and finishing.

Actually this transfer is a bit unusual except when extreme precision is demanded, but it shows the complete interchangeability of attachments between these Partners in Precision.

There are many places where these small machine tools can cut costs without the least sacrifice in accuracy. Within their capacity ranges and capabilities they are ideal in toolrooms, experimental departments and small parts production. They free larger machines for larger work—cost far less to install. A long list of attachments makes them extremely versatile—well worth investigating.

Write today for complete literature showing the P&W Bench Miller and two sizes of P&W Bench Lathes.



PRATT & WHITNEY

Division Niles-Bement-Pond Company

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that the plant is already performing up to the best expectations of those who started late in 1943 to plan the new layout.

THE Flint assembly plant receives its supply of parts from Chevrolet production units throughout the country. The new unit is the first of two postwar Chevrolet plants to go into service. A second plant in Van Nuys, Calif., is expected to begin operations in the fall. With the addition of these plants, Chevrolet will have 11 U. S. assembly centers whose combined output is rated at 9000 units per day.

The operation of the new Flint assembly is not expected to produce a corresponding increase in the total Chevrolet cars and trucks made. Rather with only a limited supply of materials available, it is expected that materials which have been assigned to other assembly units will now be diverted to Flint.

The new assembly plant will supply most of the Midwest states dealers who have been depending on assembly units as far to the west as Kansas City and St. Louis.

Some conception of the coordination of human effort that goes into the building of a Chevrolet passenger car may be obtained from the fact that in a Chevrolet Fleetline sedan body (not the entire car), there are 3973 individual parts. These parts range in size from the steel turret top to tiny washers. Metal parts and various subassemblies come from various fabricating plants, trim arrives from another Fisher plant, hardware and fittings are supplied by various Fisher Body-Ternstedt units.

To produce 50 bodies per hr, Fisher engineers explain that 200 tons of direct material must be delivered to the assembly plant each day. To build 10 different models and various trim and paint combinations, 2100 different items of direct material are necessary. Of these, 403 are fabricated metal parts. Some 380 are hardware and fittings, many of which are metal or contain metal. About 250 are trim and stock items supplied by Fisher's Ionia plant.

Up to the present time Chevrolet production has aggregated about 460,000 cars and trucks in 1947. Assuming materials and labor are available Chevrolet is now easily capable of turning out well over a million vehicles per year and may even reach this total in 1947 if uninterrupted production is possible.

British Auto Tax Put on Flat Rate $40 Per Car Basis

London

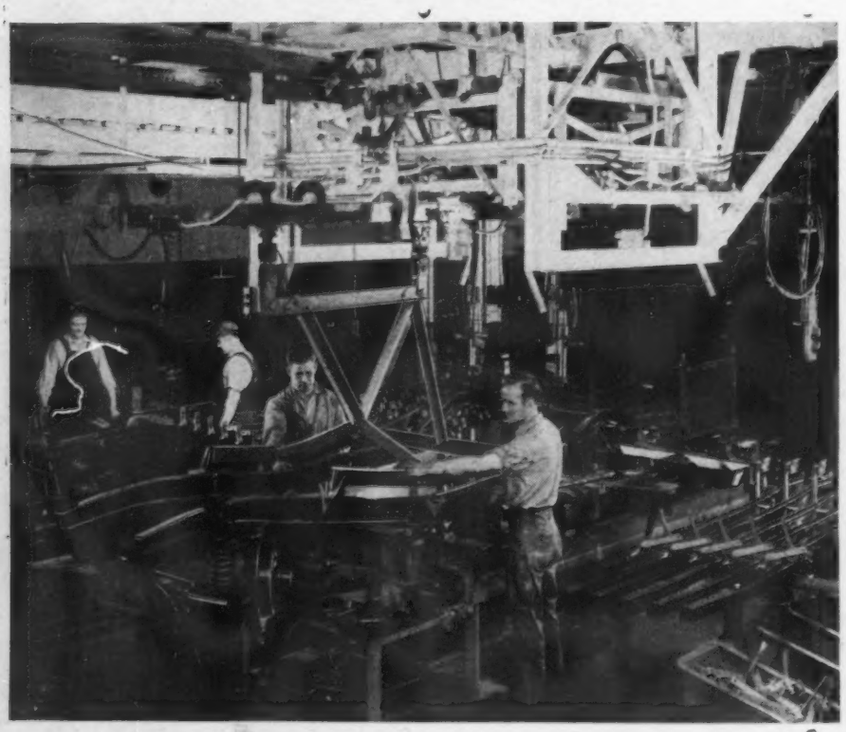
• • • **British automobile** manufacturers have for years complained that the existing system of taxation handicapped them in their efforts to compete in overseas markets. They have now been granted a new system which goes a long way towards meeting their criticisms. The horsepower tax is to be replaced by a flat rate applying to all new cars.

Up till now the rate has been £1 per hp, which means that a 10 hp car, for example, has been taxed at the rate of $40 per year. New cars put on the road after Dec. 31 next will pay the flat rate.

Automobile manufacturers have welcomed the change as enabling them to concentrate on cars of 14-18 hp suitable for the home market as well as for export. It is expected that 2 or 3 years of tooling up will be necessary before new models are produced, but meantime manufacturers can gradually place their sales emphasis on larger cars. Announcing his decision recently, the Chancellor of the Exchequer said that the form of motor taxation must give the greatest possible stimulus to the export trade. The home market must be completely subordinated at this time to export trade in order to win the battle of the gap between exports and imports.

To make up for any possible loss of revenue, the Chancellor thought it was reasonable that on the small minority of more expensive cars he should ask for an increase in purchase tax. He therefore proposed on cars whose retail price, exclusive of purchase tax, was £1,000 or more, that the existing purchase tax of 33 1/3 pct should be doubled as from June 17.

BORN RIGHTSIDE UP: *In contrast with usual automotive conveyor assembly lines, the frame of a new Chevrolet is suspended rightside up at the new Chevrolet assembly plant, Flint, Mich. Chevrolet workmen are shown here at the "elevator" where the frame is hoisted prior to being picked up by the overhead conveyor system. One advantage of a "suspended assembly" is that workmen can work conveniently on all sides of the vehicle.*



46,000 POUNDS WEIGHT SAVED

ALUMINUM CRANE built by NORTHERN ... In Satisfactory Operation over 15 Years

Illustrated here is a crane of 10 ton capacity, 76' - 6" span, built almost entirely of aluminum alloy castings and rolled aluminum structural sections. The total weight including the trolley is only 30,000 pounds. The same crane, constructed of steel, weighs 76,000 pounds.

Six of these cranes have been in continuous service since 1929, and have proved satisfactory in every detail. The light weight has substantially reduced the cost of power. Operation is speeded and usefulness increased by the faster acceleration and deceleration. Light weight reduces wear on operating parts, and materially reduces the load on the building itself.

Use of aluminum in construction of these cranes is a unique application of light metals in the material handling field.

2074

NORTHERN ENGINEERING WORKS

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HEAVY DUTY CRANES • LOW HEADROOM CRANES
BUCKET CRANES • TRANSFER CRANES • ELECTRIC
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AIR HOISTS • SPECIAL CRANES AND HOISTS

Washington . . .

EUGENE J. HARDY

• Campaign to increase steel capacity gaining allies . . . Senator Murray seeks government pressure . . . Alternative would be government plants . . . Commerce reports on 1946 profits . . . New trademark law.

WASHINGTON — Assurance of the steel industry that there is now a noticeable trend toward the balancing of supply and demand in steel is apparently making but little impression on the Federal Government, within which the pressure continues to grow for expansion of steelmaking capacity.

Steel industry officials who have appeared to date before Senator Martin's Senate Small Business Subcommittee (on steel shortages, gray markets, etc.) are generally agreed that steel will be available by the end of the year in quantities sufficient to satisfy most needs and wipe out gray markets.

It is pointed out that while as yet noticeable only to the mills, there has been considerable easing of pressure for deliveries on the part of numerous small users whose backlogs of orders are diminishing rapidly—in some cases, to the extent that salesmen are once more tapping on the doors of potential customers. It is emphasized that while these individual orders are relatively small—as in the case of steel consumers who have been forced into buying at premium prices—the aggregate is sizable.

NEVERTHELESS, moves to get the government behind a steel expansion program are now coming to a head. (THE IRON AGE, June 26, p. 74). On Capitol Hill it is led by Sen. James E. Murray, D., Mont., who feels certain that the steel shortage is not likely to end for several years and implies strongly that monopolistic or "restrictive" policies make the industry "unwilling to carry out expansion in the basic steel industry."

Senator Murray, as revealed last week in THE IRON AGE, is preparing proposed legislation on the subject and is taking further steps to inject the government into the picture. He will recommend that a resolution be adopted requiring a federal group—probably either the Commerce Dept. or the President's Economic Advisory Council—to make an official study of the industry, its capacity and estimated requirements.

"In the event unaided private capital is unequal to the expansion —or unwilling," Senator Murray declares, "I suggest the use by private industrialists of public funds from a government lending agency. I would consider here long-time loans at low rates of interest. It may be necessary to add the provision in this plan that the lending agency would suspend interest payments when, for any prolonged period, the industry's operating rate fell below a certain level."

Moreover, the Montanan's plan includes an alternative to virtually force expansion if the industry decided not to invest either its own or public capital. This would place the government back into business somewhat along the lines of wartime when the nation built plants for use by private industry—a great many of which still offer a disposal problem to WAA. Under this alternative, the government would construct steel plants which it would lease to private operators.

Presumably, considering the government's attitude toward "concentration" of industry, these plants would be leased only to independent operators. Still presuming, on the basis of historical record, the government would extend any financial aid needed to operate the plants.

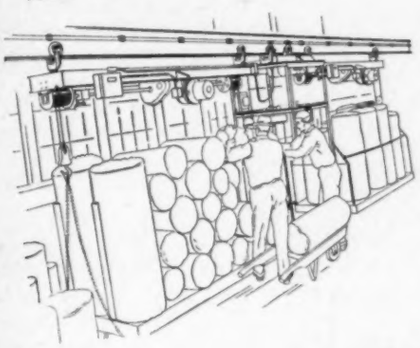
SENATOR MURRAY'S proposals are based largely upon a survey and analysis of the steel industry made at his request by Dr. Louis H. Bean, government analyst, who has been studying the fiscal aspects of employment (THE IRON AGE, June 5, p. 96). From his original survey, Dr. Bean came to the conclusion that in order to maintain full employment for the nation—set arbitrarily at around 58-60 million as envisioned in the Full Employment Act—capacity of

BOOSTER BEAN: *Dr. Louis Bean, office of the Secretary of Agriculture, Wilfred Sykes, president, Inland Steel Co., Chicago, and Sen. Edward Martin, chairman of the Senate steel subcommittee chatting at the capitol after Messrs. Sykes and Bean had testified on opposite sides of the steel capacity picture.*

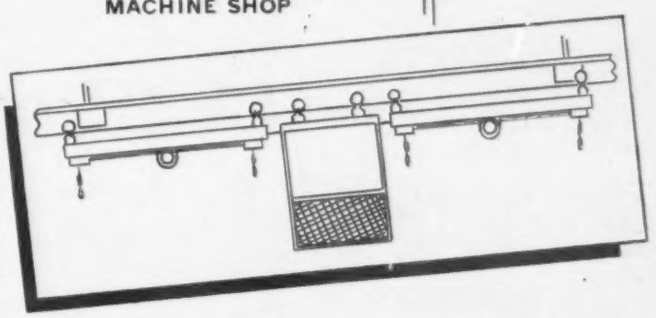
8000 lb. loads are transferred by MonoTractor Carrier to shipping platform.

SHIPPING PLATFORM

Floor trucks are lifted by hoists on MonoTractor Carrier.



MACHINE SHOP



CLOTH ROOM

Overhead Transportation with MonoTractor Drive

There are very few limitations connected with American MonoRail Overhead Handling. This installation presented at least two problems — low head room and transfer of heavy materials over large areas and from building to building. The problems were solved by American MonoRail Engineers. The equipment consists of RailMaster Shielded Track, two twin hook hoists, with cab control, propelled by an American MonoTractor.

In operation just a short time, handling costs have already shown a very substantial saving. Production has increased and manpower formerly used in lifting and hauling materials from one operation to another has been converted to more productive output.

Let an American MonoRail Engineer show you how to cut your overhead with overhead handling. This service is given without obligation.

SEND FOR BULLETIN C-1

A 56-page book showing successful applications of American MonoRail Systems.

THE AMERICAN MONORAIL COMPANY

13103 ATHENS AVENUE CLEVELAND 7, OHIO

the steel industry must be increased by 20 pct or to more than 100 million tons annually.

In the meantime, Dr. Bean (now attached to the staff of the Secretary of Agriculture) has delved more deeply into the matter, analyzing the study from an agricultural standpoint. Appearing recently before the Martin subcommittee, he stated that his analysis showed that should the industry's estimated demand (70-80 million tons) be correct, then the nation may well expect more than 10-12 million in the ranks of the unemployed shortly after 1950.

Furthermore, he said, not only employment but farm income has a direct relationship to steel production, that the line or volume of farm income for any year follows closely the same pattern of steel production. Should the industrialists be right, his analysis indicated, it would mean a reduction of from $5 to $7.5 billion in farm income and purchasing power.

"A shortage of one ton of steel below the volume required for full employment means a drop of $250 to $300 in farm purchasing power at present price levels," Dr. Bean said.

A new angle has been injected into the steel investigation, one which the subcommittee indicates it will follow up—possible decreases in potential demand for steel through substitution of other metals for iron and steel such as aluminum and magnesium, and the trend toward use of lighter gage steel as quality and technical processes improve.

This is something the government statisticians, including those in the Labor Dept., hadn't thought of; or, perhaps, it would be fairer to say, they admittedly hadn't taken it into consideration in preparing their tables and charts.

METAL manufacturing industries, admittedly the hardest hit by reconversion, made great strides in the way of recovering their wartime profit positions during the final three quarters of 1946, the Dept. of Commerce has declared upon completion of its study of business for last year.

Iron and steel and nonferrous metals corporations had fully recovered from the drastic declines which hit them at the end of the war and were once more back to wartime levels (before taxes) by the beginning of 1947, the Commerce survey indicated. However, the report added, machinery and transportation equipment industries, including automobiles, were far below wartime profit levels despite relatively good recovery last year.

Total corporate profits before taxes in 1946 were estimated by the Department at $21.6 billion—$1 billion above the 1945 total but still $3.5 billion below the peak year of 1943. Profits after taxes were set at $12.5 billion—$2 billion above the 1943 position. In comparison, nonmetal manufacturing statistics showed profits for 1946 at about 80 pct above 1945.

Net dividend payments were indicated at $5.6 billion last year, up $850 million or 20 pct over 1945; however, the Department pointed out, this represented only 45 pct of the profits as compared with 53 pct in 1945 and 70 pct in 1929.

These annual totals fail to show the wide swing which featured the profit positions during the reconversion period, the sharp decline following government cancellation of war contracts which reached a very low point in the last quarter of 1945 and recovered slowly in 1946. This rise followed rapid expansion in civilian production and was partially attributed to the price rises through the year.

As a whole, the ratio of profits before taxes for 1946 was appreciably lower than in most of the war years although higher than in 1929, the survey found. The ratio of profits after taxes to 1946 sales was higher than in the war years although below the 1929 levels.

A striking aspect of the situation, Commerce found, was the increased inventories in face of high demand and shortages. However, it is extremely difficult to separate the increase in the book value of inventories arising from price rises from the actual increases in physical volume. On the basis of the price and inventory information available, the Department estimated that price increases may have accounted for as much as $5 billion worth of the reported inventory increases during the year.

A NUMBER of revisions have been made in the rules and regulations relating to trademarks and practice before the Patent Of-

(CONTINUED ON PAGE 118)

THE BULL OF THE WOODS — BY J. R. WILLIAMS

JUMP ON THAT DESK, YOU LOUTS! GRAB ME OR DO SOMETHIN', YOU FAT-HEADS-- CAN'T YOU SEE I'M IN DIFFICULTY HERE?
IT SERVES HIM RIGHT-- THEY THOUGHT HE WAS EXERCISIN'! HE'S ALLUS SHOWIN' 'EM HOW ACTIVE HE IS!
SHOWIN' 'EM THEY WON'T GIT HIS JOB FOR A LONG TIME YET-- BUT THEY COME NEAR IT THERE!
7-4
J.R.WILLIAMS
THE WAITING LIST
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thread checking time and costs Reduced!

Only two instruments are required in many plants to solve external thread checking problems—Sheffield's new Adjustable Leadchek and the Sheffield Visual Gage with thread checking accessories. Checking is quick, accurate and inexpensive.

Write for detailed information on these instruments—and for other thread gages not illustrated.

1 **NEW ADJUSTABLE LEADCHEK** for range of 4½ to 60 threads per inch and for work up to 2" in diameter, equipped with a "tenth" dial indicator for production use or with an "Electrigage" for the toolroom where tolerances are as close as .0001". Write for Inst. No. 27.

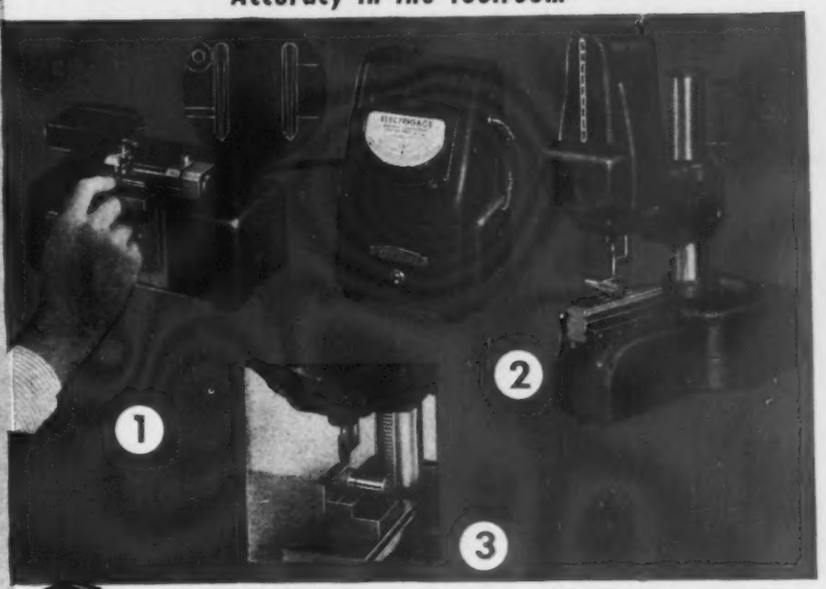
2 **VISUAL GAGE** with thread checking attachment for three wire checking of PITCH DIAMETER. Write for VG-500-45.

3 **SINE BLOCK** used with Visual Gage for checking MAJOR DIAMETER, PITCH DIAMETER and TAPER of tapered pipe threads up to 3" in diameter. Write for VG No. 4.

4 **VISUAL GAGE** with Ball Point Accessory for a rapid 2-point check of PITCH DIAMETER of parts up to 1" nominal diameter and with an accuracy comparable to the three wire method. Parts up to 2" can be handled with larger accessory. Write for VG No. 2.

5 **THREADCHEK** for the rapid inspection of LEAD, PITCH DIAMETER, THREAD ANGLE, ROUNDNESS, TAPER and STRAIGHTNESS, especially for studs, bolts and other threaded elements produced in large volume. Write for Inst. No. 10.

Accuracy in the toolroom



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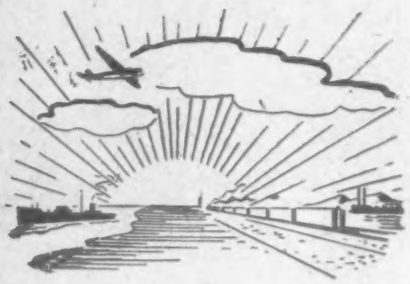
West Coast . . .

ROBERT T. REINHARDT

• Airframe industry of West Coast faces increasing losses while building better planes in falling market and thus poses a serious defense problem.



LOS ANGELES—West Coast airframe manufacturers—representing approximately half of America's airframe industry—are building better and better planes, in smaller and smaller quantities at greater and greater financial losses. Four large West Coast airframe companies lost a combined total of just under $17 million in 1946, after taking advantage of many millions of carry-back tax credits, according to John C. Lee, president, Menasco Mfg. Co., Burbank, and chairman of the Los Angeles Chamber of Commerce Aviation Committee.

Three other West Coast companies showed a combined profit of approximately $6,500,000, substantially all of it represented by carry-back tax credits which converted operating losses into apparent profits.

This occurred during the year 1946, when these same companies gave military aviation new advanced jet bombers and fighters, and gave air transportation the two leaders in commercial flying with two more being readied for airline use, Mr. Lee pointed out.

"The planes got better and better; the financial statements got worse and worse—that's the story of 1946 in aviation. That was the same year manufacturing companies in the United States as a whole showed a 36 pct increase in profits, as compared with 1945. Aircraft and parts manufacturers showed a 95 pct decrease in profits. The West Coast airframe industry, and I'm sure it's true throughout the nation, isn't going to quit and isn't going to go bust. There'll be some mergers and some suspensions of operations, but generally speaking, the larger companies and many smaller suppliers have the strength and stamina to pull through some tough times," Mr. Lee said.

"But the airframe manufacturers have pulled in their horns and will continue to until the United States establishes an air power policy, with at least a 5-year program permitting aviation's scientists and builders to engage with confidence in research and production." Mr. Lee, during the war years, managed the West Coast Aircraft War Production Council.

About half of America's airframe manufacturing industry is on the West Coast. Boeing, Consolidated Vultee, Douglas, Lockheed, North American, Northrop and Ryan companies, with their suppliers, produced a total of 78,554 war planes in the period from Jan. 1, 1942, to Aug. 1, 1945. They developed a capacity which can be conservatively estimated at 25,000 or 30,000 airplanes per year. In 1946, the West Coast companies delivered 820 airplanes of all types, military and civilian, according to the Dept. of Commerce.

IN terms of employment and business activity, the contraction of the aircraft industry has its most conspicuous effect in southern California. Here the major aircraft companies had a peak employment in 1943 of 272,000 men and women. Currently, the employment is approximately 70,000. Southern California promptly absorbed the late 1945 and 1946 layoffs, as its civilian industries expanded. That expansion has leveled off, employment has been declining and the effect of further reductions in the aircraft industry is obvious.

Commercial aviation, too, must eventually feel the consequences of the airframe industry's forced decision to pull in its horns. The most advanced of the big transports—the Boeing Stratocruiser, the Consolidated XC-99, the Douglas DC-6 and the Lockheed Constellation and Constitution—all were developed as military projects. Where will be found the $10 million or $12 million to develop the transport of the future—jet or turbo-prop powered, is a prime question with manufacturers.

The industry today has terrifying problems, in the opinion of Robert E. Gross, president, Lockheed Aircraft Corp. He believes the aircraft industry has been so overexpanded that it cannot possibly survive in its present pattern; too many companies are competing for too small an amount of business; and that the aircraft industry is plagued and distracted by every kind of standard business problem that all the big, standard companies have, in addition to its own special problems. And, finally, that the industry does not have the compensating advantages which standard business has.

"Unless the United States now lays down a 5 year building program for aviation so that our scientists and buiders can confidently engage in the practice of production, we stand a very good chance of being outstripped in technical achievement by Britain and surpassed in numbers by Russia," Mr. Gross recently stated before the Subcommittee on Aviation of the Senate Committee on Interstate and Foreign Commerce.

According to Harry Woodhead, president, Consolidated Vultee Aircraft Corp., the prospect of further sales of air transport planes is seriously limited for the next year until new national policies are adopted and the problem of all-weather flying is solved. Present planes on order will more than double present existing airline capacity, so that it is pretty clear that the market for transports will be saturated shortly. Three of the planes of the C-99 type could haul all of the passengers who now ride the streamliners, the "Chief," and the "Super-Chief," from Los Angeles to Chi-

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With Ni-Rod you can lay a smooth bead on any part of a casting—in any position. And the unusual flow characteristics of this electrode help eliminate variations in weld quality.

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cago. "Obviously, there is no market for any substantial number of this size plane for ordinary peacetime commercial use. Yet the existence of a sufficient number of these planes in time of emergency might mean the difference between life or death for our nation. One C-99 plane will carry 400 troops, but in case of trouble, 1000 large planes of this carrying capacity might be all too few."

BOEING AIRCRAFT CO. in Seattle went into the war with the country's top 4-engine bomber, the B-17 Flying Fortress. With this plane they reached a peak production of 15 ships per day, and built well over 6000 of them. Then, in 1944 Boeing began to tool up for their newest ship, the B-29. Between the Seattle and the Renton plants, seven Superfortresses a day were turned out. At the end of the war the B-29 was the only warplane still in demand, and the only ship being ordered in quantity.

Because of the demand for the B-29, Boeing had no chance to tool up for production of transports or commercial planes. They were geared for all-out war until the day the final surrender papers were signed.

At the peak Boeing had 44,000 workers employed in their Seattle and Renton plants and eight "branch plants" in small Washington towns. When the drastic cutbacks came, all production workers were laid off. Only engineers, office personnel and clerks were kept on the payroll. This gave the company a total payroll of a little more than 6000 persons.

A sales force had to be quickly put into action to sell the company's newest postwar transport, the Stratocruiser. Boeing executives took a gamble and began to tool up for 50 of these 67½ ton, double-decked giants. The plane was to sell for approximately $1,250,000. Within a year Boeing had orders from six major airlines, totaling 55 planes. Army orders began to come in for the new B-50 bomber, and these now total 133. Orders for these two ships swelled Boeing's backlog to $210 million.

Boeing now plans on hitting its peak employment in September of this year when employment will reach the 16,000 mark. Today it stands a little above 12,000.

So far this year the company has delivered six YC-97 Stratofreighters, an Army Air Force cargo version of the Stratocruiser. YC-97A's and a B are on order. The first B-50 came off the production line last week. The first Stratocruiser will come off the assembly line late this month.

The 133 B-50's, and 55 Stratocruisers now on order will utilize approximately 3½ million lb of aluminum extrusions and about 5 million lb of aluminum sheets and strips.

This Boeing B-50 bomber made its first flight last week with test pilot Elliott Merrill and Copilot Robert Lamson at the controls. It is reported that the ship quickly took to the air as it came down the runway, and by the time it hit the 2000 ft mark it was over 100 ft in the air and climbing sharply. It stayed aloft for 1 hr and 28 min, and the crew reported satisfactory progress had been made in their functional test program.

Army Air Forces disclose that the B-50 has a top speed of 400 mph, will cruise approximately 50 miles faster than any other bomber capable of flying equivalent distances, and it cruises 27 pct faster than the B-29 at equal distances.

The Stratocruiser will come off the assembly line this week.

SALT LAKE CITY—The CIO International Union of Mine, Mill & Smelter Workers, still suffering acutely from ideological cholic, scaled down its wage demands to within a few cents of what operators offered at a policy conference here last week. Utah and Nevada operators have offered 11½¢ per hr.

The union started out with a demand for 25¢ per hr plus other cost-boosting concessions. The conference trimmed this down to a minimum of $1 per day (12½¢ per hr) plus six paid holidays. Maurice Travis, leftish international president, said the union would seek a "package" settlement aggregating 19¢ per hr in some areas.

Unlike some of the other major unions, the mine and smelter workers decided against tossing the portal pay suit into the bargaining pot. The conference ruled against local unions agreeing to drop portal pay suits or to refrain from filing claims in the future. A number of these suits were filed in Utah prior to the Mt. Clements case and are predicated in part on state law.

The delegates voted also to assess each working miner $1 per week for a strike fund in case strikes are called in the industry. The nonstriking miners paid $1 per day during the long strike last year.

FIRST OF THE FIFTIES: *The first Boeing B-50, its 34½-ft tail folded to clear the hangar doorway, is rolled out at Seattle. Four 3500-hp Pratt & Whitney Wasp Major engines power the new long range bomber which is to be assigned to the Army's Strategic Air Command. In the background, a Stratocruiser.*

Simplify and Save on Hydraulic Systems with VICKERS POWER UNITS

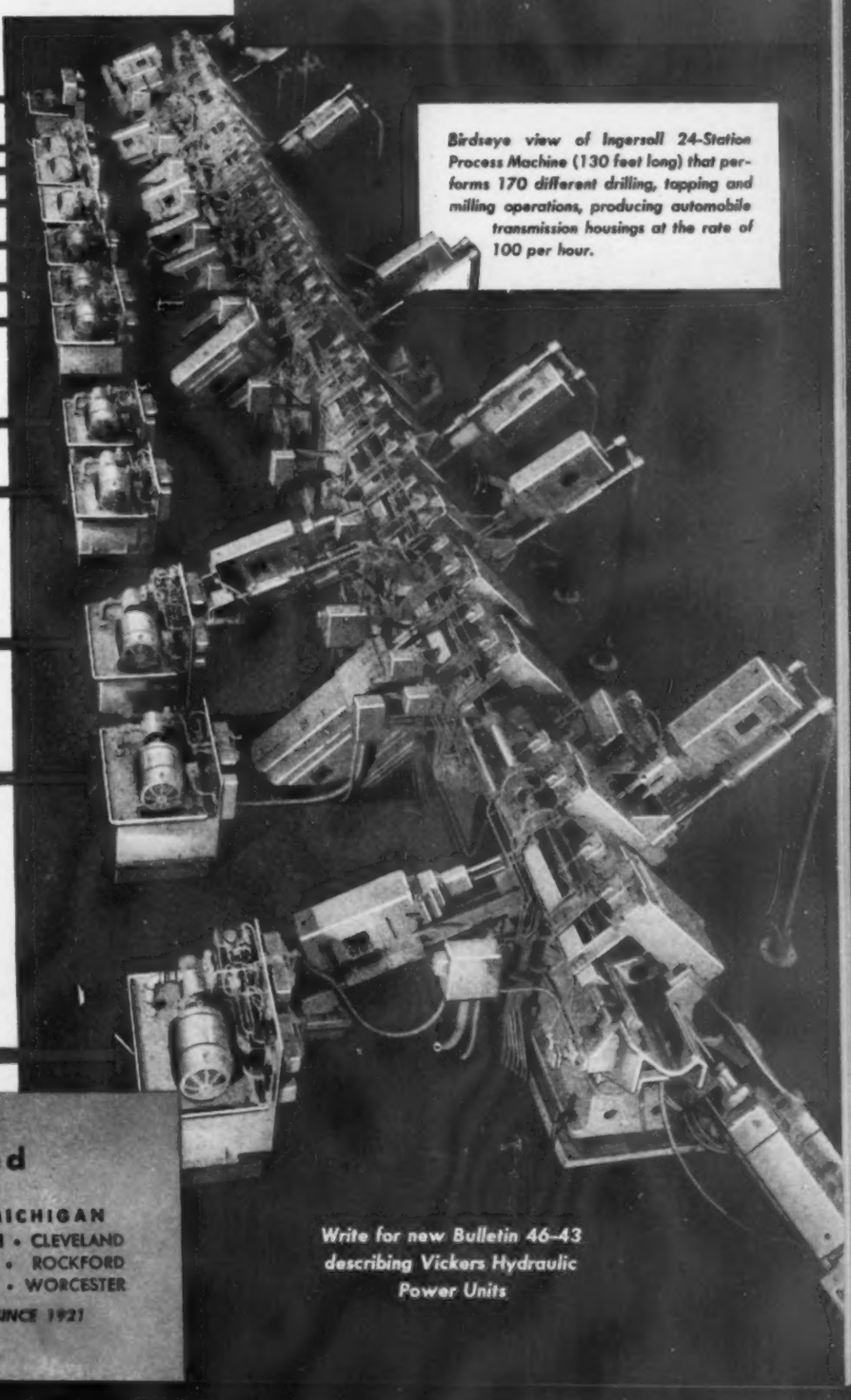
The "hydraulics" on this Ingersoll 24-Station Process Machine transfers the transmission castings from station to station and provides power for clamping, locating and chip disposal. The hydraulic system design was simplified and cost reduced by using the twelve standard Vickers Self-Contained Hydraulic Power Units shown.

These units provide a compact hydraulic power package which can be applied to almost any system. They are available with various pump combinations to meet a wide range of requirements up to pressure demands of 2,000 psi. There are 92 standard sizes and types of single stage, two stage and dual pressure pumps equipped with motors from ¾ to 20 hp.

The oil reservoir serves as a base to save floor space. On it is mounted a standard Vickers Motorpump or a Vickers pump with separate motor drive. A Vickers "balanced piston type" pressure relief valve provides accurate control of hydraulic pressure. A simple wrench adjustment sets maximum operating pressure at any desired figure within recommended pressure range. Filters and reservoir are readily accessible for cleaning. See Bulletin 46-43 for the many other features.

Vickers Hydraulic Power Units are frequently the most desirable source of hydraulic power. Vickers application engineers will be glad to discuss your hydraulic power and control problems.

3158



Birdseye view of Ingersoll 24-Station Process Machine (130 feet long) that performs 170 different drilling, tapping and milling operations, producing automobile transmission housings at the rate of 100 per hour.

Write for new Bulletin 46-43 describing Vickers Hydraulic Power Units

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Dear Editor:

NEUTRAL SALT BATHS

Sir:

On the Newsfront page of the May 22 issue, a process to maintain the neutrality of chloride-base salt baths by the use of methyl-chloride gas is mentioned as a news item. I would appreciate receiving information as to the patent or article that this news item refers to.

P. A. FODOR, JR.
Market Research & Development
Pittsburgh Plate Glass Co.
Pittsburgh

● The process was developed by Park Chemical Co., 8074 Military Ave., Detroit.—Ed.

ELECTRONIC TRACER

Sir:

We have lost our copy of the Jan. 24, 1946 issue, which refers to an electronic tracer. This electronic tracer was shown in Fig. 1, p. 168, of the Jan. 2, 1947 issue. We would like very much to get in touch with the manufacturers of this unit and would appreciate your forwarding this letter to them or advising us their name. It is our desire to investigate the use of this unit in connection with our shape cutting equipment here in our own shop.

H. C. HIRSCH
Hirsch Bros. Machinery Co.
El Paso, Texas

● We have forwarded your letter to Air Reduction Co., 60 East 42nd St., New York 17, the company which developed the tracer.—Ed.

STEEL BALLS

Sir:

We are seeking a source of supply of steel balls as used in ball bearings, and would appreciate it if you could give us the names of suppliers of these steel balls.

ALFRED CRAWFORD
President
Crawford Mfg. Co. Inc.
New Brunswick, N. J.

● Names of leading steel ball manufacturers who may be able to supply you, are being mailed to you.—Ed.

DESPERATE SITUATION

Sir:

We are turning to you for help that we desperately need. We are at the very bottom of our stock pile of pipe and steel and we have exhausted the list of suppliers in an effort to obtain material. If it is within your scope and power, we would appreciate obtaining the names of pipe manufacturers who manufacture black and galvanized pipe in all sizes, and the individuals in charge that may be contacted at the specific mills named. As many names of mills that you can submit to us will be gratefully appreciated.

CHARLES ADELMAN
Adelman Pipe & Steel Co.
Miami, Florida

● We are forwarding a butt weld pipe list, together with the names of individuals to contact in the companies.—Ed.

KEY TO FUTURE WEALTH

Sir:

Have certainly read with great interest the editorial by Mr. T. W. Lippert in the May 15 issue, "Key to Future Wealth." Also the two following ones, "Dilemma Germanica" and "The One-Way Dollar." The sincere, dynamic spirit that these editorials exude should be most highly appreciated by the industrial interests your magazine serves.

HENRY F. HAGEMEYER
President
Castings Patent Corp.
Chicago

STEEL CORPORATION EARNINGS

Sir:

We are anxious to obtain 12 copies of the chart showing relative position and financial possessions of the leading 22 steel corporations of the country. The chart appeared in the Apr. 10 issue.

JOHN MUNHALL III
U. S. Steel Corp.
Washington

CARBONYL IRON POWDER

Sir:

We are interested in obtaining samples of a finely divided carbonyl iron powder. Can you suggest possible suppliers?

FRANK C. ARRANCE
Research Dept.
Electric Auto-Lite Co.
Fostoria, Ohio.

● The General Aniline & Film Corp., Special Products Sales Dept. here in New York is forwarding a sample of their finest grade of carbonyl iron powder, grade SF.—Ed.

NEW YORK V. PHILADELPHIA

Sir:

. . . We are somewhat puzzled over the difference that exists between the New York and Philadelphia scrap markets and your opinion on the same would be appreciated.

H. S. LEE
Director of Purchases
Hendrick Mfg. Co.
Carbondale, Pa.

● The Philadelphia scrap market is a consumer market dominated by the relatively small mills in Eastern Pennsylvania, while the New York market is a large producer market, not a consumer market. Its prices represent brokers' buying prices and reflect the cost of transportation to adjacent consumer markets. There is sometimes little price relationship between scrap grades in the two markets, as in a consumer market prices reflect principally actual delivered prices to mills. When consumers are able to remain out of the market for an extended period, brokers' buying prices in a producer market are likely to vary widely from consumer markets whose prices are based on actual sales to consumers.—Ed.

SYNCHRO-CYCLOTRON

Sir:

Would you kindly send me tear sheets of the news article, "Carnegie Institute to Build 200 Million V Synchro-Cyclotron," appearing in the June 5 issue.

CHARLES L. McGRANAHAN
Assistant General Superintendent
Jones & Laughlin Steel Corp.
Pittsburgh

REQUEST FROM AUSTRALIA

Sir:

In the Nov. 14, 1946 issue there appears the program of the National Metal Show, and we are interested in obtaining a copy of one of the papers presented there, namely, "The Precipitation Heat Treatment of Work Hardened 61S-W Aluminum Alloy," by J. J. Warga, Kaiser Fleetwings. We have contacted the ASM but they did not have any copies available, and the American Consul in Melbourne was unable to give us the address of Kaiser Fleetwings. Could you advise Mr. Warga of our request or let us know his address?

A. W. SILVESTER
Chief Metallurgist
Russell Mfg. Co. Pty. Ltd.
Richmond, Australia

● We have requested Mr. Warga, Kaiser Fleetwings, Bristol, Pa., to send you a copy if available.—Ed.

METAL FINISHES

Sir:

We will appreciate your forwarding to us one copy of your booklet of four articles on "Metals, Finishes, and Finishing Processes" by Edward Engel.

JOHN C. LONNIE
Tool Engineer
J. Sklar Mfg. Co.
Long Island City, N. Y.

● The booklet is available to readers at 50¢ a copy.—Ed.

GERMAN SILVER

Sir:

Of late we have had difficulty in locating manufacturers of German silver, around North Jersey and New York. We trust this variety of information comes within the scope of your Reader Service Dept.

R. VAN HARKEN
J. H. Scharff, Inc.
Orange, N. J.

● Names of manufacturers of German silver to whom you can send your requirements are being forwarded.—Ed.

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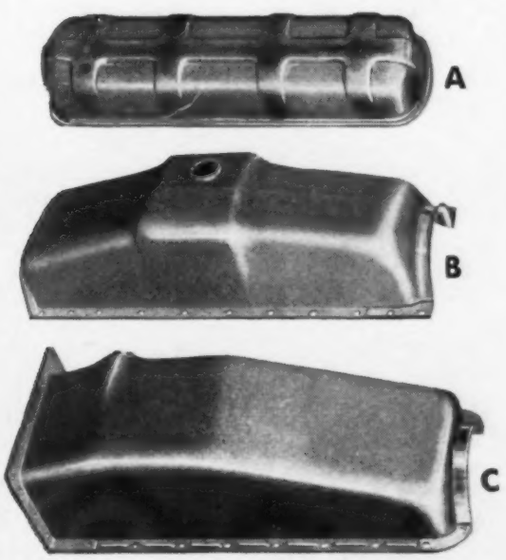

A—ONE-DRAW CYLINDER HEAD COVER; 19-1/8" long, 3-1/2" deep.
B—TWO-DRAW OIL PAN; 28-5/32" long, 7" deep.
C—TWO-DRAW OIL PAN; 26-21/32" long, 8-1/16" deep.

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PERSONALS

o o o

• **Harry Dobrin** has been named president of Furnace Engineers, Inc., Pittsburgh. Mr. Dobrin, formerly executive vice-president, is one of the founders of the firm.

• **John R. Johnston** has been appointed assistant general manager of sales of the Carnegie-Illinois Steel Corp., Pittsburgh, U. S. Steel Corp. subsidiary. He will be succeeded as manager of sales in the Milwaukee district office by **Charles E. McIntyre,** who was formerly assistant manager of sales in the Detroit district sales office.

• **Alfred W. Schultz** has been appointed director of production and planning control for Warren City Mfg. Co., Warren, Ohio. Mr. Schultz had formerly been associated with the Midland Machine Co. as chief engineer.

• **E. K. Miller** has been appointed general superintendent of the Aliquippa works, Jones & Laughlin Steel Corp., Pittsburgh, succeeding **Harry Saxer,** who has retired. Mr. Miller came to the Aliquippa works in 1929 as superintendent of steel works, since which time he has been promoted to assistant general superintendent. He was previously associated with the Tennessee Coal, Iron & R.R. Co.

• **Joseph M. Weldon** has been appointed assistant to the vice-president of the International Nickel Co., Inc., New York. He will be assistant to H. J. French, vice-president. Mr. Weldon became associated with International Nickel in 1927 when he joined the INCO nickel alloys sales department. He has been head of the aeronautical division of that department since 1945.

• **John M. Diebold** has been appointed Northern Ohio sales representative for the Precision Welder & Machine Co., with offices in Cleveland. He was formerly associated with the Rudolph Wurlitzer Co. as chief production engineer.

• **Carter P. Whitcomb** has retired as vice-president of the Griffin Wheel Co., Chicago. Mr. Whitcomb entered the service of the company in 1919 and was elected vice-president in 1930. **Charles E. Barnes,** general sales manager, has been elected vice-president in charge of sales.

• **Lawrence H. Pomeroy,** former director of national field activities for the public relations department of General Motors Corp., has been named western sales manager of Dearborn Motors Corp. Mr. Pomeroy was formerly manager of the Cleveland branch of GMAC; he joined the public relations department of General Motors in 1937. Since 1944 he has been in charge of field relations.

GEORGE D. PENCE, president, Wilson Foundry & Machine Co.

• **George D. Pence,** director of special activities at Willys-Overland Motors, has been appointed president of the Wilson Foundry & Machine Co., Pontiac, Mich. **J. G. Paule,** former assistant general manager, has been named general manager of the foundry. Both appointments are effective July 15. Mr. Pence replaces **Wallace O. Leonard,** who has resigned to take another position in California.

• **Fred K. Schroeder** has been appointed purchasing agent for foundry products and supplies of the West Allis works of Allis-Chalmers Mfg. Co., Milwaukee. **J. J. Nimtz** has been named West Allis works purchasing agent for steel and mill products. Mr. Schroeder was formerly castings and foundry supplies purchasing agent, and Mr. Nimtz was in charge of steel expediting.

• **R. C. Jayne** has resigned as vice-president and general manager of Atlas Steels Ltd., Welland, Ont. He has also resigned as member of the board of directors and executive committee. Mr. Jayne has been with the Atlas Steels since 1932 and has been a vice-president and director since 1938.

• **Fred J. Schreiber** has joined the sales organization of the Universal Steel Co., Cleveland. Mr. Schreiber was formerly associated with Republic Steel Corp.'s Cleveland district sales office for many years, serving the Cleveland and Northeastern Ohio territory on steel products.

• **Theodore E. Burke** has been appointed sales engineer in the railroad division of the Vanadium Corp. of America, New York. Mr. Burke will make his headquarters in the Chicago district office. Mr. Burke was formerly associated with the Youngstown Sheet & Tube Co. and, as a contact metallurgist, with the Republic Steel Corp.

• **E. T. Erickson,** for the past 3 years chemical engineer in the industrial water treating division of the Dearborn Chemical Co., Chicago, has been placed in charge of the Chicago City sales department.

• **Adolph G. Kammer** has been appointed director in charge of the medical activities of all plants of Carbide & Carbon Chemicals Corp., New York. Dr. Kammer will make his headquarters at South Charleston, W. Va. He was formerly medical director of the plant operated by Carbide & Carbon Chemicals Corp. at Oak Ridge, Tenn.

• **Forest H. Humphreys** has been appointed manager of the safety and claims division of the American Car & Foundry Co., New York, succeeding **Karl N. Searles,** who has retired. In his present capacity Mr. Humphreys will have charge of safety and claims in all ACF plants. In 1927 he was manager of safety and claims and employment at the Jeffersonville plant, and in 1932 the company brought him to New York as assistant general supervisor, safety and claims division.

ADRIAN O. HOLMBERG, vice-president for manufacturing, National Radiator Co.

• **Adrian O. Holmberg** has been elected vice-president for manufacturing of the National Radiator Co., Johnstown, Pa., succeeding **E. W. Longacre.** Mr. Holmberg was formerly manager of several manufacturing divisions of the A. O. Smith Corp., Milwaukee. Mr. Longacre, who has been vice-president of National in charge of manufacturing for the past 20 years, is on an extended leave of absence and will act in a consultive capacity on his return to the company.

• **Harold A. Hintz** has been advanced to the position of Pacific Coast sales manager of the H. K. Porter Co., Inc., Pittsburgh. Mr. Hintz will direct the activities of all Porter sales offices on the Pacific Coast and will maintain headquarters in Los Angeles. **J. F. Morley** has been appointed district sales engineer, with offices in San Francisco.

• **G. J. Hartnett, Jr.** has become superintendent of planning of the Babcock & Wilcox Co., Barberton, Ohio works. **M. Nielsen** has been made superintendent of production. Mr. Hartnett, who in April became assistant superintendent of the Barberton works, joined Babcock & Wilcox in 1936, after being employed by the company for several previous summers. Mr. Nielsen, for the past 8 years, has been superintendent of marine erection, with offices in New York.

• **C. A. Fegtly** has been appointed manager, and **F. W. De Klotz,** sales manager, of the Pacific Coast Div. of Pittsburgh-Des Moines Steel Co., with headquarters at the company's new Santa Clara, Calif. plant. Before the war Mr. Fegtly was chief bridge construction engineer for the Des Moines Div. of the company, and since Pearl Harbor has been chief project engineer in charge of Pittsburgh-Des Moines' wind tunnel construction contracts. Mr. De Klotz has served Pittsburgh-Des Moines in the engineering design and cost department at Pittsburgh, and later was sales engineer in the company's New York office.

• **Howard L. Wright** of the Hanson-Van Winkle-Munning Co., Matawan, N. J., has been transferred from the Philadelphia to the Syracuse office of the company.

• **Robert C. Becherer** has been appointed to the position of plant manager of the Ewart plant in Indianapolis of Link-Belt Co. He entered the employ of the Ewart plant in 1923. He has been in charge of the manufacture and assembly of malleable and steel chains and antifriction conveyer idlers, and since 1945 has also supervised the operations of the Ewart plant malleable foundry. **Warren H. Maxwell,** formerly superintendent of the positive drive shop of the Ewart plant, has been appointed general superintendent. Mr. Maxwell has been with the company since 1922. **S. L. Houck** becomes assistant general superintendent of the Ewart plant, and **Carl O. Schopp** has been appointed superintendent of the Ewart plant foundry.

• **Joseph B. Cary,** vice-president and director of the Food Machinery Corp., San Jose, Calif., and former president of the company's Niagara Chemical Div., has been elected executive vice-president of the corporation. **Ernest Hart,** formerly vice-president and sales manager of the Niagara Chemical Div., has been named manager of the Niagara operation and has been elected a vice-president of the Food Machinery Corp. Mr. Cary will assume his new duties at San Jose on Aug. 1.

JOHN L. GRIFFITH, sales manager, Federated Metals Div., American Smelting & Refining Co.

• **John L. Griffith** has been appointed sales manager for the New England territory of the Federated Metals Div., American Smelting & Refining Co., New York. Mr. Griffith has been associated with the American Smelting & Refining Co. for 17 years, and since 1945 with its Federated Metals Div. metropolitan New York office in a sales capacity.

• **Joseph H. Carter,** president of the Pittsburgh Steel Co., has been made a director of the Johnson Steel & Wire Co., Worcester, Mass. **J. Kenneth Beeson, John U. Anderson** and **James H. Morrison** were also named directors.

• **Charles H. Bodner** has been appointed tool engineer and representative in the Los Angeles area of Kennametal, Inc., Latrobe, Pa. **John H. Wright** has been named representative in the New England district. Mr. Bodner will work out of Kennametal's Los Angeles office.

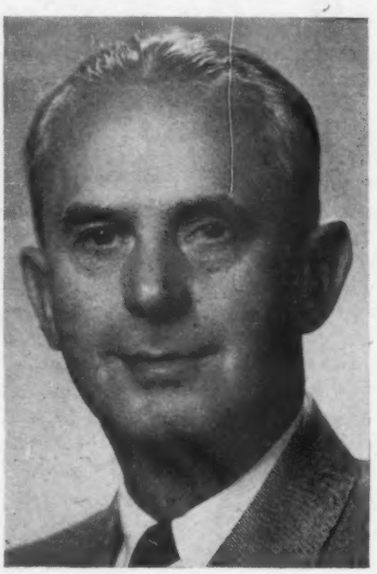
• **Lorne F. Lavery** has been appointed manager of the Detroit office and **Charles D. McCall** has been named manager of automotive sales with offices in Detroit of the New Departure Div., General Motors Corp. Mr. Lavery succeeds **F. W. Marschner,** who recently was appointed administrative assistant to the general manager.

• **Howard S. Marts** has been appointed assistant general sales manager of the Ohmer Corp., Dayton, a subsidiary of the Rockwell Mfg. Co. Mr. Marts has been associated with the organization since 1927. **Harold F. Grauel** has been named to the position of northeastern district manager. Mr. Grauel has been with Ohmer for several years as an assistant in the sales department. **Wallace Lee** has been named manager of the service department. He joined the organization in 1933.

• **Frank A. Newcombe,** manager of parts manufacturing for the Westinghouse Electric Corp. lamp division, Bloomfield, N. J., has been appointed manager of the incandescent lamp plant which the organization will build in Little Rock, Ark., and **Hans N. Horst,** assistant superintendent of the lamp division's Fairmont, W. Va. works, has been named assistant manager of the new plant.

• **James A. Wilson** has been appointed plant manager of Monsanto Chemical Co.'s Everett, Mass. plant. Mr. Wilson was formerly manager of the Monsanto plant at Trenton, Mich. **John S. Hayes,** recently project manager of the general engineering department activities at Oak Ridge, Tenn., has been appointed division engineer for the Merrimac Div. of Monsanto, with headquarters at Everett. **David H. Parshley,** Everett production superintendent, has been named assistant to plant manager. **John R. Eck** has been appointed plant manager of the Monsanto Chemical Co.'s Trenton plant. He was formerly assistant plant manager and succeeds Mr. Wilson.

• **B. C. Price** has been appointed vice-president in charge of manufacturing of the Swan-Finch Oil Corp., New York. Mr. Price has been associated with Swan-Finch since 1908. During his 39 years with the company he has served in various capacities, including director of the company. **Walter W. Brey,** controller, has been appointed treasurer. Mr. Brey has a broad and diversified background, with many years of experience in accounting, manufacturing, finance, investment and banking.



JOHN J. DAVIS, JR., railroad division, Inland Steel Co.

• **John J. Davis, Jr.** has been appointed to the staff of the railroad division, Inland Steel Co., Chicago. He joined the staff on June 23 and will become manager of sales, railroad division, on Jan. 1, 1948. Mr. Davis has been manager of railroad sales for the Carnegie-Illinois Steel Corp. in Chicago since 1944. He succeeds **William J. Hammond,** vice - president and manager of sales of Inland railroad division. Mr. Hammond will retire in January.

• **Francis E. Murphy** and **Henry G. Meyer** have been appointed assistant production managers of the Pennsylvania Salt Mfg. Co., Philadelphia. Mr. Murphy was formerly director of development at Pennsalt's Whitemarsh research laboratories. Mr. Meyer was formerly assistant to the production manager.

• **N. H. Callard** has been appointed manager of rural electrification, industry sales departments, Westinghouse Electric Corp. His headquarters will be at East Pittsburgh. Mr. Callard will assume responsibility for development plans and coordination of sales efforts pertaining to the farm and rural market of the industry sales departments and the manufacturing divisions. Prior to war service, he was manager of central station sales of the Pacific Coast district and later distribution apparatus manager of the agency sales department.

• **C. Foster Brown** has been named general office manager for the Ceco Steel Products Corp., Chicago.

• **George L. Nunn** has been appointed southern Connecticut sales engineer of the Austin-Hastings Co., Inc., machinery division, Cambridge, Mass., and will operate from an office to be established in the New Haven district.

• **Helge Hoglund,** vice-president and manager of the machine tool division of the Van Norman Co., Springfield, Mass., since 1943, has resigned. Previously, Mr. Hoglund was sales manager of the company which he joined in 1933.

• **Joseph E. Bayne** has taken over his new duties as general sales manager of the Lincoln-Mercury Div., Detroit. He has served as general sales manager of Plymouth Div. of Chrysler Corp. for the past 7 years.

OBITUARY...

• **George F. Golby,** manager of Jessop Steel Co., Ltd., and the Ajax Distributing Co., Toronto, died June 13.

• **Roy R. Zipprodt,** research and consulting engineer, committee on reinforced concrete research, American Iron & Steel Institute, New York, died June 20.

• **Lee Showers,** 68, a retired executive of the Pittsburgh Plate Glass Co., Pittsburgh, died June 16. Associated with the organization for 43 years, Mr. Showers served as general superintendent of the firm's window glass plants for a 13-year period until his retirement in 1944.

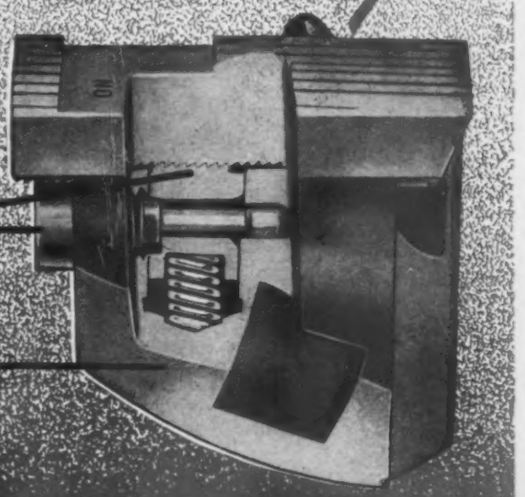
• **Christopher H. Bierbaum,** 83, vice-president and consulting engineer in charge of research of the Lumen Bearing Co., Buffalo, died June 15.

• **Leonard P. Winter,** special assistant to the general manager of the Budd Co., Detroit, died June 16.

Five Good Reasons Why...

JONES & LAMSON

Ground Thread TANGENT CHASER DIE HEADS



PRODUCE BETTER THREADS at LOWER COST!

THREAD QUALITY

1. The Die Heads are hardened and ground throughout. The body is not only ground, it is lapped on the face and in the dovetail slots. The bearing surfaces of the chaser holders are also ground and lapped into the body.

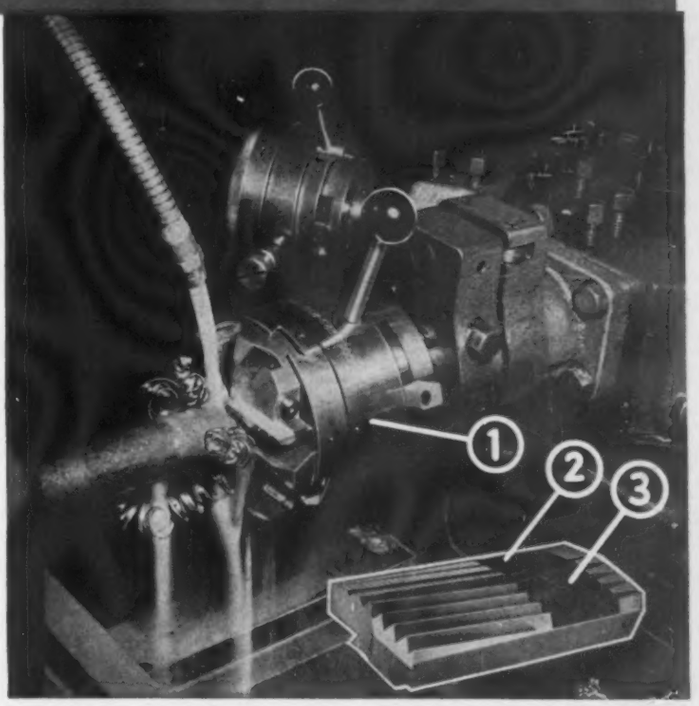
2. Jones & Lamson Ground Thread Tangent Chasers are guaranteed to produce threads to Class III specifications.

3. *The exact helix angle, in fact all the elements of an accurate thread are ground into the chasers after hardening.* The possibility of poor quality threads and costly scrap, due to faulty chaser setting, is eliminated.

ECONOMY

4. *Jones & Lamson Tangent Chaser Die Heads are universal. Only one set of chaser holders is required for all right-hand threads, and only one set of holders is required for all left-hand threads within the rated capacity of the die head, regardless of pitch or diameter.* Investment in chaser holders is reduced to a minimum. Change over and set up is speeded.

5. Chasers are easily and quickly set. Ratchet-teeth on the back of the chasers, corresponding to ratchet-teeth in the holders, provide definite locating points for resharpening, measuring and setting. The chasers are positively and quickly secured. A couple of turns of a single screw releases or secures them in the holders.



If you are interested in greater economy and better quality in threading, fill in the coupon and we will send you our valuable handbook "Thread Elements and Formulas", together with complete information about our Die Heads.

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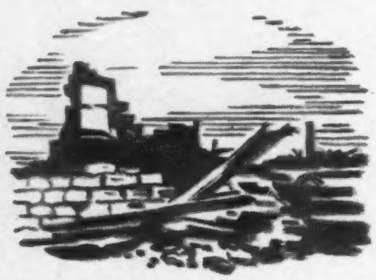
IA

European Letter . . .

• Marshall's offer may be Europe's last chance of securing the tools of reconstruction . . . Nations must show their readiness to finish job.



LONDON — With characteristic directness, Mr. Bevin has been to Paris to take up with the French government the question of Europe's response to Mr. Marshall's offer. For the moment the response is being couched in strictly practical, immediate terms. This is inevitable, for the time is so short that it barely suffices even for assembling the necessary data for stating Europe's combined needs. There is, nevertheless, some danger in an approach that gets down too exclusively to brass tacks.

It has been argued that only some gigantic conception of forward-looking statesmanship is likely to ignite the necessary enthusiasm for the project in American opinion; and the reports of that opinion that have been coming across the Atlantic serve only to underline the judgment. There is a tendency in Europe—in spite of all past experience—to overrate the power of an American President or Secretary of State to manage Congress.

It would be foolish, in concentrating on the technical details of a plan of European reconstruction, to forget the political aspect of the whole project. A combined list of requirements is not likely by itself to create much inspiration in America; it can so easily be represented as no more than a change from competitive begging to organized mendicancy. The statesmen of Europe would be wise not to be too practical; imaginative idealism may, in this instance, prove to be the most practical quality of all, since it may be needed to procure the dollars on which the practical calculations depend.

NEVERTHELESS, it is manifest that the first task must be to draw up the statement of needs, and it is with this that the governments are concerning themselves. The Quai d'Orsay has unofficially proposed the establishment of *ad hoc* committees to compile, chapter by chapter, the needs of the various European countries, and it is probably on these lines that the first conversations will develop.

This process should not take long. For almost each of the man scarce commodities, there already exists a mass of information and statistics. Before the UNRRA missions ceased work, they produced a series of admirable reports on the needs and deficiencies of most of the Eastern European countries. The United Nations Subcommittee on the Devastated Areas (from whose report the Economic Commission for Europe was finally born) has accumulated a great deal of evidence and the Economic Commission itself has in its possession, as a legacy from the European Coal, Transport and Emergency Committees, detailed information compiled both on a national and a functional basis. It should not require many weeks to build on the basis of all these details a general statement of Europe's needs and to fix for the various items — food, coal, fertilizers, machinery—a scale of priorities.

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But such a list would be far removed from the concept of European self-help which Marshall clearly has in mind. The next task should, therefore, be to balance this first assessment with another list —the list of contributions which the European nations themselves could make to restore their economy.

This idea of a common stock pool, which was one of the basic ideas underlying lend-lease, was actually proposed last autumn as one of the methods of carrying on a modified UNRRA program for another year. At that time the nations of Eastern Europe were prepared to contribute their quotas. Now a new start has to be made, but there is no reason why it should not follow the same lines.

THE outline of European self-help would begin to look a little less shadowy if, for instance, Great Britain offered to put into the pool enough wool and rubber to cover the deficiencies. The French could contribute phosphates from North Africa. If the Russian harvest is good, there might be wheat as well as timber from the East. The Poles and the Czechs might renew the offer of some food and timber that they made last autumn, and a small quantity of Polish coal is already allocated by the European Coal Committee.

Self-help need not, however, be confined simply to the contribution of commodities already available. This section of the budget should include an assessment of Europe's present and potential productivity, and an estimate of what outside assistance would be necessary to raise productivity in the shortest space of time. A section of this sort would necessarily be concerned with such questions as the provision of fertilizers and the best use to be made of mining and agricultural machinery.

The last phase in the elaboration of the European balance sheet would lie in setting Europe's needs against its contributions and drawing up, not a demand note for dollars, but a list of concrete needs—so much wheat, so much coal, so much machinery.

Such an approach would have two advantages. In the first place, it would go back to the one really successful experiment in international pooling—lend lease or, more accurately, mutual aid. In the second place, it would put squarely in the picture the interest of American cotton growers, machine manufacturers and farmers in securing what would, in fact, be a gigantic order sheet for their particular products.

It is much easier for the economic

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

Goodyear Tire & Rubber Co. are making a 30-foot rubber electric heating pad to dry the inks used in printing textile fabrics.

get ready with CONE for tomorrow

Farnsworth Television & Radio Corporation has the "Utiliscope", a television set that shows, in any room, a continuous picture of operations in a remote, inaccessible or dangerous part of a plant.

be ready with CONE for today

The Moore School of Engineering of U of P is building an electronic computor. It is reported that this new machine is faster than the famous ENIAC, will remember fifty times as many numbers and uses only 3,000 tubes, instead of 18,000.

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The new Blaw-Knox equipment pulverizes coal by self-abrasion in a blast of super-heated steam.

be ready with CONE for today

The Marmon-Herrington 44-passenger trolley bus uses light metals to reduce weight to 17,230 pounds.

get ready with CONE for tomorrow

General Electric Company has two steam turbine generators under construction for electric power companies. These will use steam at 2,000 pounds pressure and 1,050 degrees and develop 125,000 kilowatts.

be ready with CONE for today

Western Pine Association hopes to cut lumber drying time to 4 hours by the use of acetone spray.

get ready with CONE for tomorrow

Flaw-free 90° creases can now be formed in thermoplastic sheet of .005" to .020" thickness up to 30" wide on a repetitively uniform, high-speed production basis with a newly designed machine incorporating thermostatically controlled "instant-crease" action developed by the Sheet Plastics Equipment Division of Taber Instrument Corporation.

Dow Latex 512 is offered as an immediately available substitute for linseed and other vegetable oils.

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In a new method of bridge building, developed at the University of Illinois, the concrete roadway is rigidly connected to the steel structure. This "composite construction" is said to save 30% in the weight of steel beams used.

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Shell Chemical Co. has plans for the commercial production of glycerin from petroleum in 1948.

get ready with CONE for tomorrow

National Carbon Co. claims that its new flashlight cell has double the capacity of previous cells due to improved chemical mixture.

Commonwealth Edison Co. has a "cyclone" burner in its Calumet Station that removes 80% of the coal ash as molten slag in the burner.

be ready with CONE for today

Improvements and innovations in multiple spindle automatic bar machine design will be represented by the new models on display at the Cone Automatic Machine Co. booth at the Chicago Machine Tool Show.

get ready with CONE for tomorrow

Link-Belt Company's Electro-fluid Drive is a combination of electric motor and the familiar "fluid flywheel". It reduces the starting load, cushions shocks and prevents damage from overload.

be ready with CONE for today

Experimental work on a process for forming cold bonderized sheet steel under pressures as high as 230,000 psi is being conducted by Heintz Manufacturing Co. of Philadelphia. If successful, the process may greatly reduce the cost of many common steel articles.

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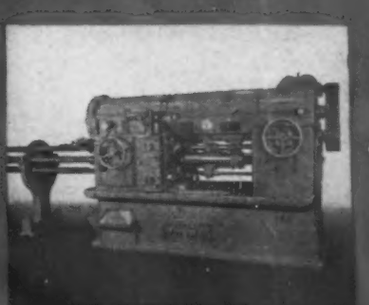
Put the *usual* jobs on any automatic.

Put the *particular* jobs on a CONE.

From 1⅞" dia. SAE 1112 a 6-Spindle Conomatic produces the part shown in 44 seconds.

See the CONE booth at the Machine Tool Show.



CONE

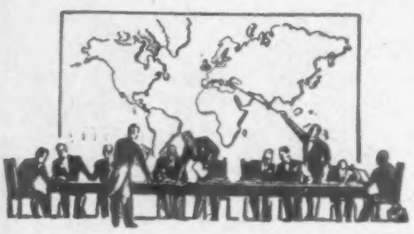
AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

41

European Letter . . .

isolationists in America to persuade the American producer that foreign aid is a drain on American resources, if it is presented to him as a general financial transaction and not as an order for the products he himself is interested to sell.

IF THE negotiations opened by Bevin in Paris develop in the direction of a new plan of mutual



aid for peace, the implementation of the plan will bring the negotiators immediately up against two difficulties. The first is the question of the governmental machinery through which the plan can be elaborated. The second is the attitude of Russia.

On July 5, the European Economic Commission of the United Nations meets at Geneva and it can be argued that, since its task is precisely to forward the reconstruction of Europe, its committees and its secretariat should be used as the instrument of the new policy. This may indeed prove to be practicable later on, but at the moment the secretariat barely exists and certainly has not yet a momentum behind it comparable to the energy with which the European nations will need to go to work to get their balance sheet drawn up before their last dollar reserves are exhausted.

In fact, a large part of the fact-finding work ought to be well advanced by early July and for the moment the French proposals, not for diplomatic committees, but rather for *ad hoc* working parties of experts is undoubtedly correct. These bodies should be able, before the Economic Commission meets, to prepare the outline both of a scheme of reconstruction and of a plan for its implementation.

If the Commission approves the steps already taken, there is no reason why the *ad hoc* committees should not continue their work as a sort of temporary secretariat to the Commission. Nothing would so quickly bring it to life and give it authority as to begin its career with an enormous and concrete job of work undertaken by the finest experts the European governments can place at its disposal. But the vital thing in the next weeks is to get the experts to work.

The great political advantage of the Commission is that it includes the Russians and has the warm support of the Poles and the Czechs. But it is absolutely necessary to be certain that this advantage does not quickly turn into an obstacle to any sort of progress in elaborating the plan.

Nobody who has worked in the United Nations in the last 2 years will underestimate the Russians' capacity for delay and stone-walling, if obstruction is Moscow's desire—as it so often seems to be.

HOW can the governments which wish to work out a quick and concrete response to the American offer test Russia's real willingness to work with them to the same end? The chance of genuine Russian cooperation is not one that ought to be missed. But the risk of Russian sabotage is not one that ought to be run.

Clearly it will be necessary to apply objective tests to the Russians' intentions, designed to find out, not merely what they are willing to do, but also whether they are prepared to do it quickly enough. The first test could be the drawing up of a timetable, from which no subsequent departure could be permitted. The tempo both of European economics and of American politics require the matter to be decided this autumn. By Christmas, Europe's dollars will be running very low and Europe's needs will be very urgent.

Moreover, since 1948 is a presidential year, the best—perhaps the only—chance of securing congressional approval would be at a special session to be summoned in October or November, before the regular session next January, whose proceedings will, first of all, be engrossed by the normal legislative business of the New Year and will later be overshadowed by the election campaign.

In short, the plan must be ready at the latest by early September. With that deadline established, a timetable can be drawn up — late June to early July, establishment of needs; late July to early August, assessment of contributions and of possible aids to productivity; late August, elaboration of the final balance sheet. Any nation falling badly behind this timetable, or attempting to delay others in elaborating their policies, must automatically be excluded from the scheme—which will either exist in concrete form by September or have no chance of securing Congressional support.

Another obvious test is the test of contributions. The good faith of the participants in the plan can be measured by their genuine effort to contribute something to the common pool and the offer of these contributions, too, must fit rigidly into the timetable.

Every effort should be made, naturally, to prevent these tests from looking like attempts on the part of the Western Nations to put Russia on the spot or to hustle the Soviets away from the Conference table. The friendliness of the intention to collaborate should not be in doubt.

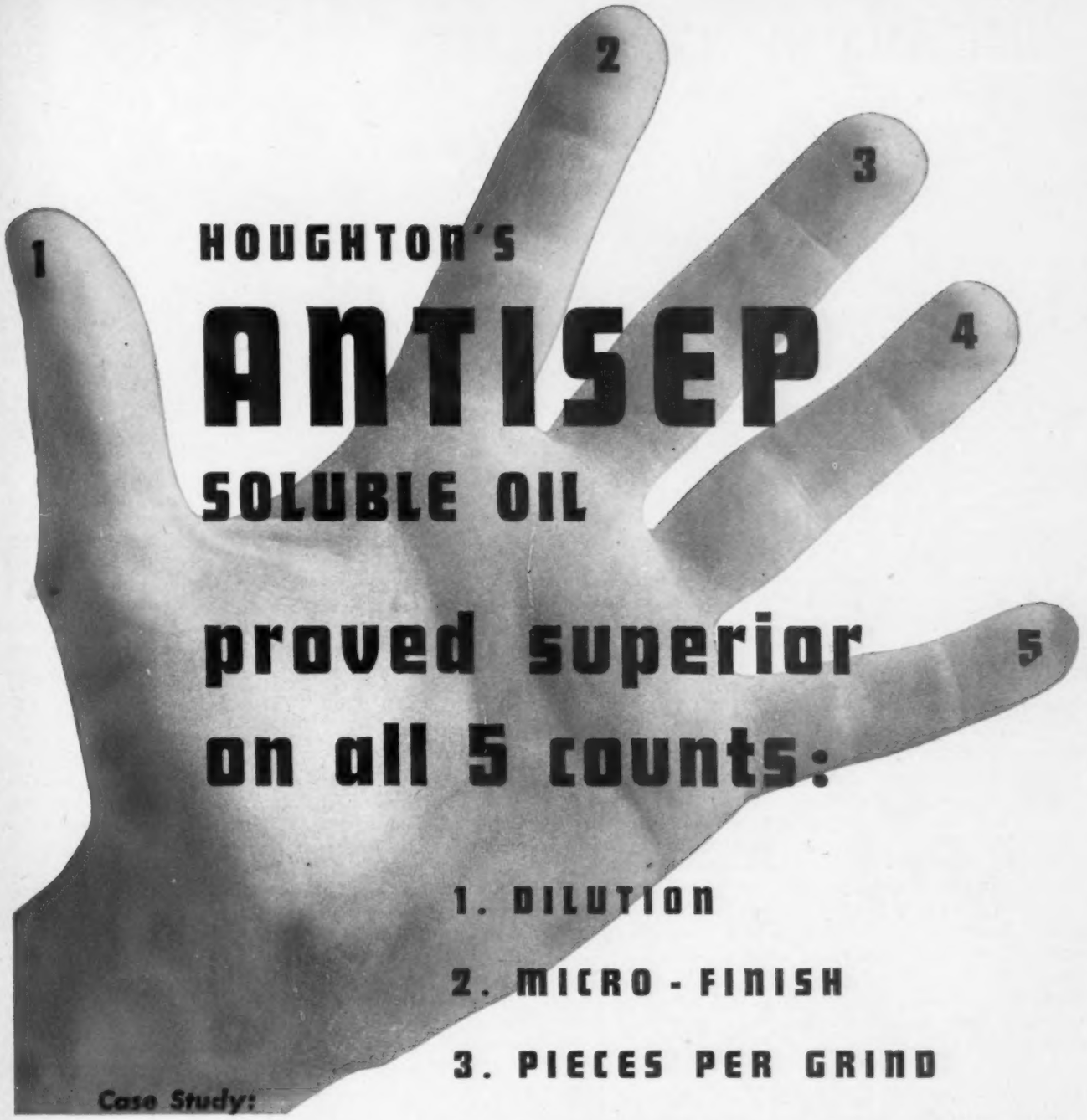
Yet it is equally clear that if some nations exclude themselves—by delay or by obstruction—the other nations cannot afford to hesitate or hang back. The enemies of Europe today — starvation, continental ruin and universal economic collapse—are too grim to be flirted with in some species of phoney war.

Marshall's offer may be the last chance of securing the tools of reconstruction. The European nations must show, with all they possess, their readiness to finish the job.

Belgian Steel Output Steady

London

• • • **Steel output** in Belgium in May was held around the April level of 230,000 long tons. Iron ore imports from France this month have been cut by the French railway strike and arrivals from Sweden are also reported down. Bigger supplies of coke are expected from Holland soon.



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proved superior on all 5 counts:

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Case Study:

The operation: finish-grinding crank holes in connecting rods.

Results with Antisep, as compared to former coolant:

Dilution 80 to 1—formerly 40 to 1.

Finish 20-25 micro inches, formerly 30 to 40.

Pieces per grind: 275; formerly 200.

Machines much cleaner.

Operators happy with Antisep.

Test ANTISEP for yourself and learn firsthand why this revelation in water-soluble cutting oils is spreading from shop to shop. For details and prices, write E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pa.

The Oil that's changing cutting fluid standards!

Industrial News Summary...

- **Coal Impasse Would Floor Steel**
- **Raw Steel Rate Drops 20 Points**
- **Top Level Meetings Progressing**

IF THE behind-the-scenes negotiations between representatives of industry and the United Mine Workers do not result in a satisfactory coal contract soon, the steel industry will be flat on its back within a period of 3 weeks. Chances of such an agreement being reached were not too remote at midweek and some large steel companies were taking the long gamble of keeping their operations at a high level on the basis that a national coal strike would not occur—or if it did it would be short lived.

Other steel companies have been forced to cut back operations, the greatest decline occurring in units of the U. S. Steel Corp. The operating rate for the country this week has dropped 20 points to 75 pct of rated capacity from last week's revised rate of 95 pct. This sharp fall-off is a direct result of the coal situation and compared with a much slower decline of more than a year ago when the industry required 4 weeks of a coal shutdown before the rate declined 20 points.

It is expected that unless coal miners return to work within the next week or two, the nation's steel operating rate will decline rapidly and may fall below 50 pct 3 weeks from now. Already steel consumers are suffering the most serious setback since April 1946. This is all the more serious since the steel industry had been reaching the point where deliveries were taking on a normal aspect. A forced operating rate of slightly less than 50 pct in the steel industry would mean a monthly loss to steel consumers of 3,500,000 tons of steel ingots. A prolonged tieup would strike a much harder blow to the country's economy because the industry would be unable to maintain operations at the half-way mark for more than a month.

RUMORS circulating that the peace offering of a 35¢ an hr increase made to John L. Lewis by Benjamin F. Fairless, U. S. Steel Corp. president, has resulted in a break in the northern operators' front, are unfounded. Reliable information indicates that the operators' negotiating committee is behind every effort which would prevent a national coal strike which at this time, because of low coal supplies, would give the country one of its worst industrial setbacks since the war ended.

Until top level negotiations on the coal situation, which have been progressing since last week, reach a point where total agreement is almost assured, there probably will be no "full dress" official meeting and discussions between coal operators and the United Mine Workers. The wage and safety program features in the union demands are not now a stumbling block. Discussions at midweek gave no clear indication of an immediate break in the coal labor crisis. Such demands as an increase in the welfare fund contributions, time and a half for Saturday and double time for Sunday, taken by themselves regardless of previous time worked, and an argument over possible protection to the union from certain provisions of the new Labor Act, were still being thrashed out.

Specific actions taken by industry so far in an attempt to forestall a national coal tieup represent one of the most conciliatory moves made by management in the entire history of labor relations. It follows closely on the heels of the same type of approach used in settling the steel labor problem more than a month ago. If in the face of this a disastrous national coal strike results, it cannot be said that industry in general did not go more than half way on the basis of facts uncovered so far. On the other hand the present situation is a challenge to the United Mine Workers to obtain one of the best contracts in its history—that it will get it appears more than likely.

DESPITE the coal labor situation, the scrap market this week remained in a strong position pricewise. Advances occurred at Chicago and Detroit which were a belated reflection of the strength which developed in other districts a week ago. Because of the Chicago advance THE IRON AGE steel scrap composite price went to $35.58 per gross ton, up 83¢ a gross ton from last week's figure of $34.75.

Steel consumers this week saw all chances of a balanced supply and demand steel market fade away. The cut in steel operations will hit automobile makers hard. Further declines in steel shipments expected next week will probably spell the difference between a 5 million-car year and one which will wind up with a lower figure. Many car makers are expected to concentrate their attention on new models which are reported well advanced in some cases. Pontiac, Olds, Buick and Cadillac should be ready to go into production of new models by the end of the year if the supply situation has become brighter.

Again this week there was no indication of any falling off in the volume of new steel orders. In most cases fresh business was running ahead of outgoing shipments. Vacations at some steel plants, scheduled before the coal shutdown, will further tighten the supply lines on some products.

It can be expected that most steel consumers who were on the point of "taking it easy" on new orders have now become panicky and will revert to their past practices of exerting pressure wherever and whenever it can be done. A definite competitive situation has arisen in the steel industry because of the nonuniformity in the various cutbacks because of the coal situation. If those firms which have taken a long gamble and have maintained operations at peak levels are rewarded by a quick coal settlement, they will be that much further ahead in having supplied the needs of their own particular customers.

• **FREIGHT CAR BOTTLENECK**—Although car builders in the Midwest have repeatedly refused to give THE IRON AGE any statements on the car building program, the chief bottleneck appears to be a general labor shortage. Full page advertisements in local newspapers have not been fruitful. Pullman-Standard Car Mfg. is offering free transportation in a 30 mile radius to workers in areas surrounding at least two of its midwestern plants. Trainees are at a premium and Chicago observers say the chance of fully meeting car building schedules despite the now available materials doesn't look good.

• **WISHFUL THINKING?**—Hope for improvement in deliveries of merchant wire products in the third quarter is wishful thinking according to John Graham, general manager of sales, American Steel & Wire Co. Although American Steel & Wire Co. production rose to an all-time high in May, Mr. Graham can foresee no appreciable filling of the pipelines in the third quarter. Moreover, third quarter quotas will not be changed, and in fact, are endangered by the present coal crisis.

• **EMPLOYMENT TRENDS**—A slight increase in both quits and lay-offs in the manufacturing industries during March caused the separation rate to rise from 49 to 52 per 1000 workers, according to the Bureau of Labor Statistics. The hiring rate of 51 per 1000 remained constant. A sharp rise in lay-offs in nonferrous metals fields was interpreted by the BLS as reflecting increased contract completions and filling of inventories. With the opening of the Great Lakes northern shipping, however, accessions in the mines rose from 39 to 61 per 1000.

• **WAR CONTROLS EXTENDED**—To obtain time to iron out differences between House and Senate as to which powers and controls should be continued, a joint resolution has extended until July 15 all existing authority under the Second War Powers Act and all controls now exercised over exports and imports. In addition to petroleum, the legislation involves tin and its products, antimony, coal and a number of other industrial materials. Indications early this week were that Congress would rush stop-gap legislation temporarily extending premium payments for copper, lead and zinc production. Except for exploration, these expired June 30.

• **PIG IRON SUBSIDIES**—Subsidy payments to pig iron producers who exceed their shipment quotas have been extended from June 30, the original expiration date, to Dec. 31, 1947, says Housing Expediter Frank R. Creedon. Two basic changes were made in the regulations covering the program. One permits the Housing Expediter to notify producers from time to time to ship over-quota tonnage, or any part of it, to designated manufacturers of "needed" housing items. A second change reclassifies some producer, shifting them from the $12 group to the $8 group.

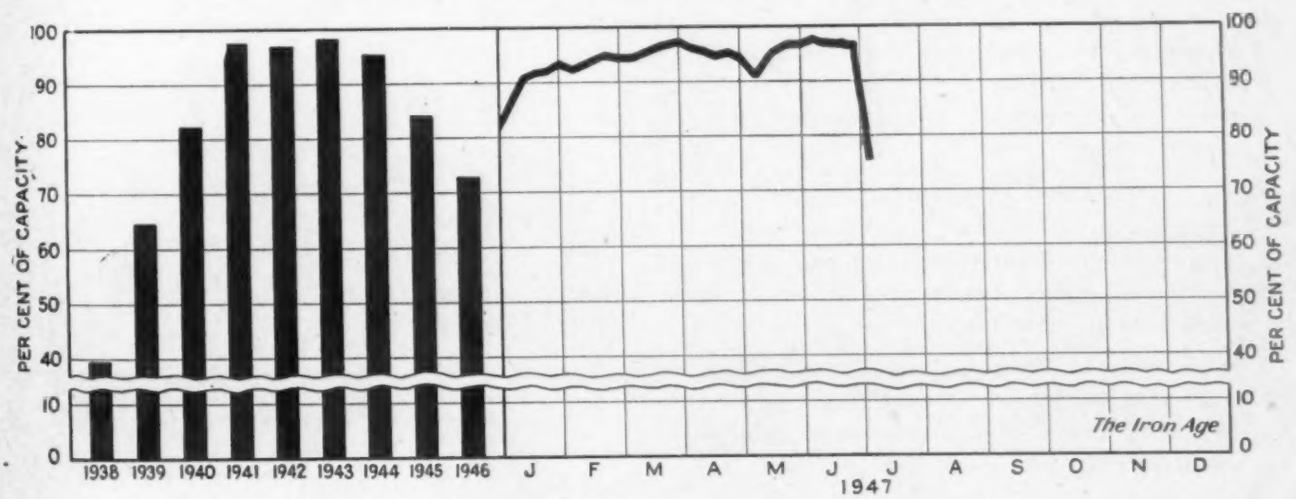
• **VACATIONS**—Approximately one out of every five companies now grants wage earners paid vacations of 3 weeks or more for lengths of service ranging from 10 to 25 years. About 25 pct of the companies allow long-service salaried workers more than the usual 2-week vacation. More than 51 pct of the companies pay wage earners for holidays not worked, with most of these companies granting from 6 to 12 paid holidays per year.

• **EXPORTS REACH PEAK**—U. S. exports for May reached a new postwar peak of $1.4 billion in May, an increase of $159 million over April; on the other hand, May imports fell from a total of $511 million to $473 million, further widening the gap between the two, according to the Census Bureau. The export total includes $56 million in UNRRA supplies and $3.8 million lend-lease goods.

• **PLATE PRICE INCREASE**—Worth Steel Co. has advanced its base price for carbon steel plates to $2.90 per 100 lb at Claymont, Del., an increase of $2 per ton. The company states that the higher price is required by the increased cost of raw materials. No increase has been made in the price of heads.

• **GEAR SALES**—The gearing industry, as represented by the members of the American Gear Manufacturers Assn., shows a decrease in volume of sales for May 1947 as compared with April 1947 of 8.7 pct. This report does not include turbine or propulsion gearing. The index figure for May was 387.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
June 24	101.5*	96 0	92 0	93.0	92.0*	102.0	100.0	99.0	101.0	101.0	98.0	84.0	74.0	95.0*
July 1	63.0	93.5	58.0	78.0	52.0	82.0	80.0	89.0	101.0	106.0	102.0	82.0	80.0	75.0

* Revised.

Bumpers and similar parts that require good cold-forming quality in steel are stronger and more economical to produce when made of N-A-X HIGH-TENSILE.

N-A-X HIGH-TENSILE's resistance to deformation (denting) is 60% greater than the denting-resistant quality in carbon steel. Its inherently fine grain and higher hardness provide a better surface texture for plating.

If you have parts requiring a combination of high strength, good formability and better surface texture, it will pay you to investigate N-A-X HIGH-TENSILE steel.

SAE 950 is synonymous with N-A-X HIGH-TENSILE STEEL

GREAT LAKES STEEL CORPORATION

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN • UNIT OF NATIONAL STEEL CORPORATION

Hold Contracts Need Not Be Reopened Under New Labor Law

But July 1948 Date Is Set For Written Authority On Dues Check-Off

o o o

By KARL RANNELLS
Washington Bureau

o o o

Washington

• • • **Fear that under** the Taft-Hartley Labor Relations Act the recently signed 2-year contracts in the steelmaking and metalworking industries must be reopened next year appears to be groundless—on the basis of interpretations by proponents of the Act and those concerned with its drafting.

"It was the special concern of the makers of the Act that no provision should result in interference or otherwise dislocate the orderly execution of existing labor contracts before their termination," a member of the Senate Labor Committee staff told THE IRON AGE.

Points of special concern to the steel industry and its related unions involve those provisions pertaining to the union shop, maintenance of membership and the check-off. These are admittedly the heart of the present contracts.

While the Act bans the closed shop, the union shop is permitted providing a majority of the workers want it; on the other hand, the workers are permitted to petition the NLRB for a vote on the question of knocking out the union shop. Likewise, the check-off is permitted only upon the individual authorization of union members.

Wording of the clauses pertaining to effective dates had tended to lead to the belief that "compulsory unionism features" in existing contracts would be valid no longer than "the end of the contract or until one year after the date of enactment (June 23), whichever first occurs."

The Senate-House conference committee was especially concerned about providing a smooth change-over from the old Act to the amended Act and provision was made relating to existing closed shop and other compulsory unionism agreements and for the effect of the amended Act upon existing certifications.

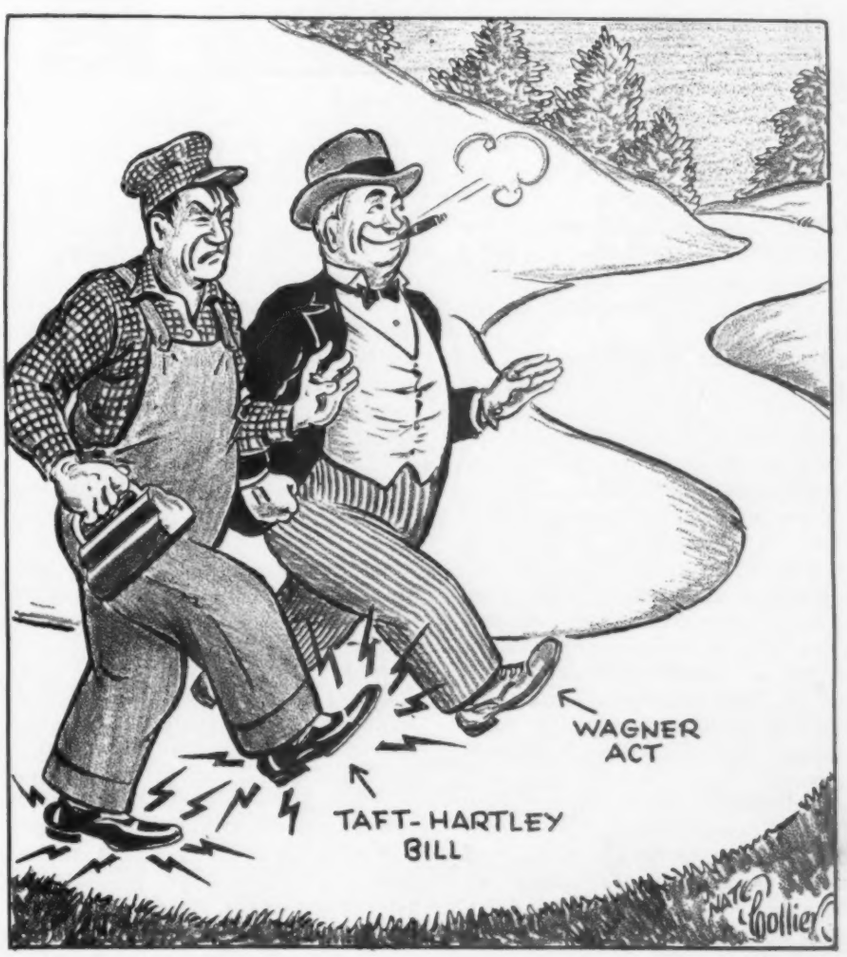
It is pointed out that Sec. 102 of the Senate amendment provides that "no provision of this title shall be deemed to make an unfair labor practice any act which was performed prior to the date of enactment of this Act which did not constitute an unfair labor practice prior thereto . . . (or) the performance of any obligation under a collective bargaining agreement entered into prior to the date of enactment . . . unless such agreement was renewed or extended subsequent thereto."

This, it is held, clearly indicates that Congress, in writing the Act, did not intend to interfere with the "compulsory unionism" features of the steel or similar contracts before their termination dates.

However, a specific cut-off date of July 1, 1948, is provided for the check-off clauses in any contracts which run beyond that date. Sec. 302 of the Act provides that for new contracts—as well as existing agreements with termination dates beyond next June—"money deducted from wages of employees in payment of dues in a labor organization" shall not be made unless the employer has received "a written assignment (from each employee) which shall not be revocable for a period of more than one year or beyond the termination date of the applicable collective bargaining agreement, whichever occurs sooner."

It is the considered opinion of some of the lawmakers that with respect to the current steel con-

New Shoes



tracts all that is required in order to conform to the amended Act is for the unions concerned to obtain written check-off authorization from their members by next July 1.

Reopening of the contracts could accomplish no more since the checkoff is automatically removed from the bargaining table through prohibition of deductions except when specifically and individually authorized.

Obviously, interpretations of these and other provisions of the Act will remain controversial until the revamped NLRB lays down rules for administration and many of them have been tested in the courts.

CURTAIN RAISERS: *These are the gentlemen whose bill opens a new era in labor management relations. Rep. Fred A. Hartley, Jr., left, and Sen. Robert A. Taft, right, are shown in a capitol corridor during the course of the bill's stormy passage.*

Unlike the proponents of the Wagner Act, the supporters of the Taft-Hartley Act do not claim it is perfect. Already probable defects are showing up. On the contrary, many who voted to override the presidential veto admit it had flaws but hold that it is better than no bill.

It is the intention of this group to work for correction of any provision which proves unworkable, unjust, or destructive of labor's rights. This does not appear to be mere lip service to mollify labor for enactment of a law so bitterly opposed by its leaders. The bill provides for a Congressional scrutiny of its operation; to this end, even before the Senate had acted on the veto, Sen. Joe Ball, R., Minn., had been named to head the joint Senate-House committee to ride herd on the administration of the measure.

It fully realized that careless or unfriendly handling of the Act's provisions could do irreparable damage. Most certainly, this committee will keep a weather eye on the administrators—particularly any government agency having to do with labor.

Two agencies, the Labor Board and the Labor Dept., have themselves invited this close observation because of their outspoken opposition to the passage of the act. While honest opposition does not necessarily impugn the motives of the critics, unfortunately neither does it inspire confidence in those they have opposed.

The Act, however, increases the Board membership from the present three—who have been asked by President Truman to remain on the job—to five. Since the Senate must confirm these appointments, it is a foregone conclusion that considerable thought will go not only into making the nominations but into bestowing the approval of the upper house.

Moreover, the powers of the general counsel, an office now vacant, are considerably expanded. He will have general supervision and direction of all attorneys employed by the Board (exclusive of trial examiners and legal assistants to individual Board members) and of all the offices and employees in the Board's regional offices.

Also, the counsel will have final authority to act in the name of—but independently of control and review by—the Board in investigating charges, issuing complaints, and prosecuting violations before the Board. This has the effect of centralizing the responsibility for regional action in one person who is answerable to the President and the Congress.

It is also obvious that many of the provisions of the Act will be brought into the courts for ruling as to their constitutionality. One clause, however, has the distinction of having been ruled upon—that relating to featherbedding or prohibition of the employment of standby workers for work which is not done or intended to be done. On the day that the new Act was enacted, the Supreme Court upheld the validity of the Lea (anti-Petrillo) Act which forbade such practices by musicians.

Five-Day Week Plan In British Coal Pits Reducing Production

London

• • • **Production of** coal in Britain with a five-day week instituted May 1 is not coming up to expectations and Mr. Shinwell, the Minister of Fuel and Power, and a number of the miners' leaders have told the men of their disappointment—some of the union leaders in no uncertain terms. There has been more than one hint that it may be necessary to go back to six-days working.

Overall output per man-shift immediately before the five-day week ranged from 1.03 to 1.05 long tons. It rose to 1.11 tons in the weeks ended May 17 and 24, the first in which the five-day week operated without interference by holidays or other special circumstances. But the improvement has not been maintained. In the week ended June 7, the rate was down to 1.08 tons.

It is being impressed on the men that only a substantial increase in output per worker can justify the five-day week while the country is so desperately short of coal. Recent output figures for mined coal are: Week ended May 17, 3,844,100 tons; May 24, 3,802,300 tons; June 7, 3,660,600 tons; June 14, 3,691,200 tons.

FTC Resumes Fight Against Multiple Basing Point System

Washington

• • • **Renewing its attack** on basing point price systems, the Federal Trade Commission has singled out the use of a multiple basing point system on certain refined corn products and a zone system on other such products by leading producers in that industry as major premises for a complaint alleging a combination and conspiracy to fix and maintain prices, and terms and conditions of sale.

In the earlier Staley and Corn Products case, FTC was upheld by the Supreme Court in its fight to outlaw the single basing point system in regard to glucose. So-called "phantom freight" charges figured largely in this case. The court ruled that this system of pricing was a violation of the Clayton Act. It was made clear, at that time, however, that the court was not passing on the legality of the multiple basing point system, such as that used by the iron and steel industry. The court now has before it the Cement Institute in which FTC seeks to outlaw the multiple system. This case will probably be decided at the term which opens in the fall.

In the current complaint, filed on June 26, FTC charges 19 companies which are said to account for 95 pct of the corn derivatives manufactured and sold in this country with a whole host of practices and policies which make up the alleged price-fixing conspiracy.

"Matching" of delivered prices through concurrent employment of basing point and zone pricing systems is one of the principal practices challenged by the complaint, which alleges violation of both the Federal Trade Commission Act and the Robinson-Patman Act.

Other practices and policies allegedly put into effect by the respondent producers are listed in the complaint as follows:

(1) Meeting together at frequent intervals to exchange information and discuss and inquire as to prices, terms and conditions of sale.

(2) Disseminating on a daily basis "full details of transactions

Complaint Filed Against Corn Product Companies Alleges Price-Fixing Tactics

° ° °

of sale" by each respondent.

(3) Disseminating at frequent intervals "complete information regarding production, sales, shipments and inventories," as well as current and future price quotations.

(4) Compiling, disseminating and employing common collections of freight rates for the purpose of calculating delivered price quotations.

(5) Selling on the basis of delivered price quotations calculated by adding to a base price at designated geographical points the rail freight from such points to the destination of shipment, irrespective of whether shipment is made from the basing point.

(6) Selling on the basis of zone delivered price quotations, whereby the same delivered price is quoted to all customers of the same class within each of about 20 geographical territories, except as modified in certain zones by use of the basing point system.

(7) Refusing to permit deliveries of various corn products to buyers' trucks or to calculate delivered price quotations by adding truck or water carrier rates to base prices, or upon the basis of transportation charges involved in shipments to customers, where such practices would result in lower delivered price quotations than those calculated by means of the basing point or zone system.

(8) Refusing to quote or sell on prices calculated by adding actual shipping charges to a price f.o.b. the actual shipping point.

(9) Fixing and maintaining identical terms and conditions with respect to the following matters: Credit; cash, quantity and trade discounts; allowances for returns of containers and unused corn derivatives; differentials for warehouse, tank car and other means of delivery to customers; charges for installation of pumping and other service facilities and for performing service functions for customers; guarantees against price declines on orders; booking of orders for future delivery, as well as the lengths of time and prices at which such orders may be booked; payment of advertising and promotional allowances to customers; giving of bonus or free goods to customers; label allowances on packaged corn derivatives; differentials between factory and private brands of packaged corn derivatives; and container differentials.

(10) Maintaining an "inquiry system" whereby daily reports of transactions and quotations which deviate from the prices, terms and conditions previously reported are questioned and the reporting member required to explain such deviations.

Basing Point Data

New York

• • • References to past news items in The Iron Age on the basing point system as it relates to steel are as follows: May 3, 1945, p. 74; Sept. 13, 1945, p. 99; Sept. 20, 1945, p. 109; Sept. 27, 1945; p. 95; Oct. 4, 1945, p. 121; Oct. 3, 1946, p. 85.

Group Elects New Officers

Pittsburgh

• • • **At the annual** June meeting of the Electric Metal Makers Guild, Inc., the following officers were elected for the coming year: President, R. H. Frank, superintendent of melting, Bonney Floyd Co., Columbus, Ohio; vice-president, A. J. Scheid, Jr., superintendent of melting, Columbia Tool Steel Co., Chicago Heights, Ill.; secretary-treasurer, D. L. Clark, superintendent of melting, Simonds Saw & Steel Co., Lockport, N. Y.

Hourly-Paid Employees At the Ford Motor Co. To Receive Pensions

Detroit

• • • **Granting of a** pension to hourly-paid Ford employees has come as somewhat of a bombshell. Few observers here conceded the union a chance for its pension demands this year, and it has been reported that many weeks of negotiations were held before pensions were seriously brought into the discussions.

While details have not yet been worked out it has been established that 97,000 Ford production workers will receive a wage increase of 7¢ per hr and 10,000 skilled employees will get a wage boost of 12¢. In addition approximately 8¢ will be contributed by the company into a pension fund.

Union officials estimate that over the next 10 years the Ford contribution will aggregate $200 million plus $15 million per year to maintain the necessary balance in the fund. The company has not commented on its financial obligations under the pension plan.

Details of the pension plan remaining to be ironed out include payments of death benefits, disability provisions, surrender value of insurance contracts and eligibility requirements. Under the announced terms of the plan Ford employees making $3000 or under would contribute 2½ pct of their earnings; those earning $3000 and over would pay 5 pct. Estimated pension at 65 years of age to a Ford worker earning $1.40 per hr is $130 per month, according to Richard Leonard, UAW-CIO vice-president.

Reaction in Detroit to the Ford plan is mixed. Some hail this as "another Ford first" as significant as $5 per day. Others have commented that the pension plan should promote labor stability and that payments into the pension fund are definitely not inflationary. Another comment heard was to the effect that "Ford has, in effect, given the union the key to the back door of the plant."

Actually Offer C-R Steel

Chicago

• • • **Sizable stocks** of steel products are being sold by the WAA in the Chicago area during the first two weeks in July. One list includes critically needed flat-rolled steel and another list is made up of large sizes of hot-rolled alloy steel rounds.

1,300,000 lb of cold-rolled and hot-rolled is being offered to priority claimants, only, at fixed prices through the WAA catalog CG-91-1194. This stock consists of 310,000 lb of cold-rolled sheets and strip, including some stainless. About 800,000 lb of hot-rolled sheets, flat bars, plates and stainless strip are also included in the catalog.

TO SPREAD GOSPEL: *William L. Batt, president of SKF Industries, Inc., outlines to Secretary of Commerce W. Averell Harriman the aims of "200 industrial missionaries" who are representing U. S. industry, labor, agriculture, and government at the 8th International Management Congress in Stockholm, Sweden, July 3-8.*

Says Pipe Exports Are A Cause of Oil Shortage

Washington

• • • **Declaring that a** primary reason for the threatened oil shortage is the scarcity of steel tubular goods and sheet steel, Sen. Edward Martin, R., Pa., chairman of the steel sub-committee of the Senate Small Business Committee, has called for an immediate embargo on further exports of these items.

Senator Martin said his investigating group had found that American exports of these goods had more than doubled in 1946 and 1947 over prewar rates, and that in 1946 alone, more than 65,000 tons of pipe and tubing had been shipped to Russia alone. Meanwhile, pipe and casing shortages hamper domestic oil production, he asserted.

Under the Hyde Park Agreement, he added, there are no controls over exports to Canada with the result that the 876,000 tons of steel shipped there in 1946 amounted to more than twice the 1938 total of 409,000 tons. First quarter 1947 shipments indicated a million-ton rate for the year, he declared, and information in committee hands indicated that there are now at various American port areas about one million tons of steel pipeline sections awaiting shipment to Saudi-Arabia.

"[Domestic] producers are having a difficult time obtaining sufficient pipe for casings," he said. "With many steel producing facilities shut down or curtailed by the coal strikes, this serious situation now has become critical. . . . Fuel oil and natural gas cannot be made available in sufficient quantities next fall and winter to heat homes, offices and factories and to operate the machines of industry unless more pipe is made available —and quickly."

Drops Pigment Controls

Washington

• • • **Declaring that** domestic supplies are now adequate to meet requirements, the Office of International Trade has removed export controls on lead free chrome pigments, effective as of June 27.

Consumers Use Conversion Deals to Increase Steel Supplies

Final Cost In Multiple-Mill Market Seen Much Higher Than Regular Price

o o o

By D. I. BROWN
Chicago Regional Editor

o o o

Chicago

• • • **Consumers desperate** for steel products have in the past year turned every stone and jumped all kinds of fancy handsprings to augment their supply. Their contortions have defied all the conventional economic rules of obtaining steel and have established more important twists in the national supply picture than those recently aired in the gray market hearings in Washington.

Market observers here point out that any shortage always creates gray markets, or bootlegging, whether the item be bathtub gin, cigarettes or nylons. Steel has proved to be no different but due to the complexity of steel manufacture, distribution and the wide variety of application, the juggling has been somewhat fancier in this product.

Aside from the daisy chain—gray market selling (mostly short) of steel products—an intensified drive by consumers has developed to help themselves obtain steel by purchasing semifinished material. This supply line is more involved than the gray market; however, the parties in this business sign bona fide contracts, know who the suppliers are, get prompt delivery and everything is above-board. The end price in either practice is much higher than the standard industry prices through regular channels. The latter practice is considered to be perfectly legal and moral, whereas for some undisclosed reason steel received through the back door, which is sold like cigarettes kept under the counter used to be, is not considered ethical.

Different types of rolling and melting facilities of the various mills all over the country permit "multiple-mill" production. Very early after VJ-Day consumers took advantage of this natural condition. Mr. Kaiser seems to have started the idea by shipping ingots from California to Detroit for conversion into sheets. Since then, the "multiple-mill market" has mushroomed into a large business. Consumers have scoured the country in efforts to locate the mills whose production of ingots or slabs or any semifinished exceeds that mills finishing capacity. These excess ingots or semifinished tonnages are then purchased either at the standard mill price; so much over the cost of scrap; or by the highest bidder. The semis are then shipped to mills, often hundreds of miles away, which have excess finishing capacity. Here the product is converted into sheets or bars and then reshipped to a plant for final use. At the moment the multiple-mill market shows a little weakness. Some observers believe that by January 1948 the practice may be discontinued. Inland Steel Co. on the other hand declared that they are booked into December 1947 on conversion into flat-rolled products.

The cost of the final sheets in the multiple-mill market has in cases been higher than even some of the gray market prices, according to reports from some of the companies involved. Delivery time is usually better than can be had by a consumer waiting his turn for the same mill to ship the same material on the regular quota allotment.

Usual practice is for the mill which converts the material to keep the scrap discard involved. On ingots converted to deep-drawn sheets or other quality steel, the loss or scrap generated in conversion can run as high as 30 pct. Costs involved in multiple-mill transactions are higher than straight inventory disposal, which testimony in Washington named as the largest single source of gray market steel. Some of the participants of multiple-mill steel say that this market is not without occasional agents who collect commissions for locating or securing steel sources and processing facilities.

One typical example may be cited as indicative of the legitimate cost involved in multiple-mill processing. Copperweld Steel Co. in Warren, Ohio, has for some time actively sold ingots for outside conversion in large tonnages. At times ordinary carbon steel ingots have cost about $70 a gross ton f.o.b. Warren. Much of this material has been shipped into Chicago for conversion. Freight to Chicago on ingots is $6.46 a gross ton. Inland has been converting steel from many sources at the rate of about 30,000 net tons a month. Copperweld has been one of Inland's semifinished sources. On 16 gage hot-rolled sheets, 48-in. wide, which Inland has made in this manner in large tonnages, Detroit has been one of many destinations.

To ship such sheets to Detroit costs $6.40 a net ton. The arbitrary Detroit basing point on sheet shipments from Chicago to Detroit is not used on converted material. Sheets supplied in the ordinary manner are shipped from Chicago to Detroit at but $3 a net ton. The lowest total cost to lay these sheets down in Detroit was about $145 a net ton. The product cited here is one of the cheapest types of sheets obtainable, free of many extras that would apply on other types of sheets.

At times consumers have obtained cold-rolled material in the multiple-mill market. Final cost on these products is much higher and other conversions in bar products have been equally expensive. At one time a consumer bought SRQ carbon billets which were shipped into Chicago for conversion into concrete bars. This product was also reshipped elsewhere. The procedure of those converting the semis was very well covered by J. L. Block, vice-president in charge of sales, Inland Steel Co., in testimony on gray market hearings in Washington. He said, "We purchased the semifinished material at a price delivered at our plant, which with proper allowance for extra cost of handling outside steel, was equivalent to our own cost for similar

products. We sold the resultant product to the consumer at the regular established price."

Market men here say it is not conceivable that sheets so obtained by desperate customers are directly involved in the usual gray market transactions. In the first place, these observers maintain, that initial cost to get the sheets is so high that the product could not possibly be sold at the going gray market price, except at a loss. At the same time they admit it is possible that due to later developments a distressed purchaser of the multiple-mill material might be forced to sell some unbalanced inventories, which could include the expensive sheets. Such a case, observers say, could not in any way constitute an intentional participation in a gray market.

The lines of movement in the multiple-mill market criss-cross the country in every direction. Fontana ships from the West Coast to as far east as Ohio, West Virginia and Kentucky. Melting units on the East Coast often ship ingots as far west as Chicago for conversion. In between, ingots, slabs, billets, finished steel and component parts, such as auto frames, weave and wander between producing and consuming centers and back again. The complicated movements are frantically followed by a hoard of expediters and traffic men.

Expensive hauling has not dulled the demand despite recent freight increases. The main difference in ultimate prices to the consumer by either method, is that in the gray market more middlemen are involved, and excessive profits are the chief goal.

Some of the largest users in the country are securing steel via the multiple-mill setup. Industry observers point out that as long as steel is scarce the practice will undoubtedly continue regardless of the high cost. Companies making products such as alloys, forging steels, tool steels, etc., who have never before made steel for sheets, are finding themselves in this business. The converters say that consumers maintain that an ingot is an ingot regardless of size, shape or who made it. In some cases the mills doing the converting have found that ingots or slabs furnished by those not usually in this business for conversion into sheets are not up to ordinary quality standard. For the most part, however, consumers until recently were overlooking precise qualities, as their prime concern was more steel regardless of price or quality. Consumers who have been leaning on multiple-mill production admit that breakage and scrap is in cases higher than normal, but under past conditions could be tolerated. The trend in the past 2 weeks has reversed itself and users are insisting that quality be maintained.

The multiple-mill market has been predominant in flat-rolled products. This innovation has caused some misunderstanding by consumers who have not fully understood the setup. At times, those users who have not employed the latest methods see their competitors getting more steel while their supplies from the same mill are not increasing. Semifinished secured from outside sources has permitted the converters to schedule rollings not otherwise possible. The steel is stocked at the heating furnaces and rolled intermittently and at any convenient time. This production does not have to await a melting schedule and often comes into the converting mill already conditioned and ready for breakdown on strip, sheet and plate mills.

SINKERS COMING UP: *This steel conveyor turns corners and can run in circles. Made by Cyclone Fence Div., American Steel & Wire Co., it is of open construction to permit air circulation to cool a lightweight product while it is in motion.*

C-I's 45-In. Slab Mill Sets New World Record

Homestead, Pa.

• • • **The new Homestead** slabbing mill of Carnegie-Illinois Steel Corp. made a world's record for one month's production of steel slabs during May. The new record is 159,792 tons of slabs, more than 8000 tons better than the old mark achieved during the war by another Pittsburgh district steel producer.

The new slabbing mill, known as the 45-in. mill, was built and operated by the government by Carnegie-Illinois during the war, to help meet urgent steel needs. It began operating in January 1944 and has rolled more than 4¼ million tons of slabs since then. The company purchased the mill from Defense Plant Corp. last year.

OHE Reports on Housing

Washington

• • • **Approvals of** nonhousing construction have averaged about $53 million weekly to date in 1947, according to a report by the Housing Expediter's Office, which said the total amounted to $1.16 billion through June 12.

Since the limitation order (VHP-1) became effective in March 1946, the OHE said a total of more than 116,000 applications involving $3.6 billion had been approved and 69,000 in the amount of $2.4 billion had been rejected.

Coal Shutdown Seen as Leveling Influence on Steel Scrap Prices

But Trend Has Been Upward And Quick Break Might Bring Further Gain

o o o

New York

• • • **Settlement of the** coal labor dispute within the near future is expected by scrap market observers to mean higher scrap prices. During the period of uncertainty over coal there have been few big purchases to boom the market. Many steel mill spokesmen say it would be uneconomical to try to make up for large pig iron losses by charging additional scrap. They have therefore not made large scrap purchases because of its scarcity and tight market position. This has tended to hold scrap prices level since the start of the coal walkout.

Many mills already committed to this policy began cutting back blast furnace operations soon after the miners began their walkout on June 23. Since then there has been little strong mill buying.

However, it is thought that a quick break in the coal strike might see a resumption in the upward trend in scrap prices. This trend has been upward since heavy melting steel scrap prices reached their year's low during the week of May 20.

The accompanying chart shows average delivered prices of No. 1 heavy melting steel at Pittsburgh, Philadelphia and Chicago from price decontrol through the week of June 23. In the first week following decontrol, this price (THE IRON AGE scrap composite) rose from $19.17, the OPA average, to $24.42.

The last coal strike lasted from Nov. 21 to Dec. 7, during which time this composite price remained at about $25 ($24.75 on Nov. 12 and $25 on Nov. 26 and Dec. 3). On Dec. 17, in the week following the end of the coal strike, the composite jumped $3.17. This was due to gains of $5 and $4.50 at Pittsburgh and Philadelphia, respectively. Chicago followed a week later with a $5 increase.

From here the heavy melting steel market moved up almost without a break to the year's high of $39.67, reported on Mar. 18. This period was marked by frenzied efforts to get every available ton of steelmaking scrap to support rising operating rates. Pittsburgh mills were buying two to three times what they normally bought through New York brokers. Chicago melters were reaching down to Texas and into New England. Pittsburgh was pulling material from the South, right past the Birmingham openhearths.

The steel city mills were buying in New England and upper New York. Many of these deals were open market purchases, others were earmarked material from consumers. All this is vouched for by dealers and brokers who took orders from brand new customers. Some were even called off golf courses to execute swift deals on one hectic Sunday. Many of those who took the Sunday orders were said to have hit heavy sledding trying to cover the following day.

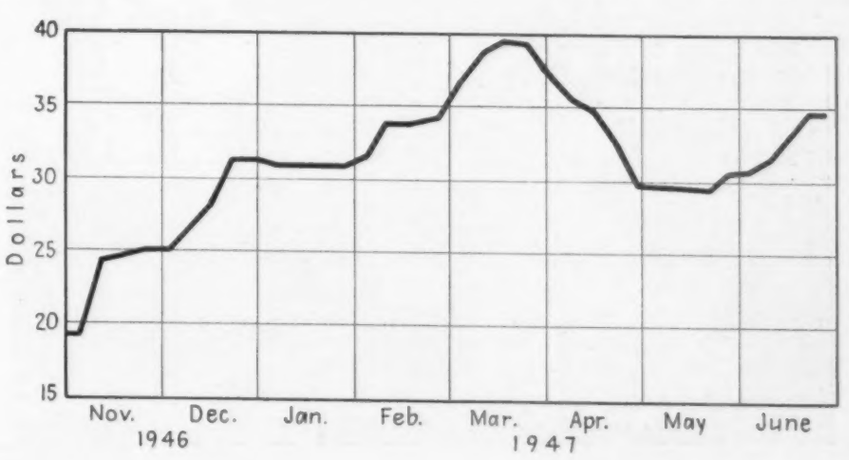
In drawing conclusions from the current market picture, scrap sources insist that the causes of the previous price zoom should be recalled. So far, they say, there has been little repetition of those frenzied practices in the current rise which began at the end of May. Though anticipating a firm market when production returns to normal, they feel that absence of the erratic buying tactics of this spring may keep prices from hitting their spring peaks.

Trade sources agree that there has been some increase in out-of-district purchases in the past few weeks. Some New York brokers, late in the week of June 9 had orders for Pittsburgh delivery at $37.50. They began to buy at $29 but within a day had to pay $30 and two days later the New York buying price was up to $31, too high to cover for Pittsburgh. This is the only attempt reported in recent weeks of Pittsburgh mills to make substantial purchases in the New York area.

Recent district reports pointed to some Pittsburgh buying in the South, some Chicago buying in Indiana and some "raiding" of the St. Louis area. But most scrap market observers doubt that steel mill purchasing agents will embark on a similar throat slitting campaign again this summer.

It is felt, however, that the recent decline was a testing of prices. Brokers at that time reported that material seemed to be drying up—whether on the vine or in the yard is still not certain. They assert, that with minor exceptions, the recent rise has been due to scarcity, and that higher prices have been bringing out more material.

One of the largest consumers in the country is still out of the market. It is agreed in the trade that had this buyer come in during the past week or two prices for heavy melting steel would be at least $1 higher today. Further, there is a natural tendency for collections to slow up during the summer months. This may not be repeated this year but some dealers assert they may have to pay a bit more to keep the peddlers on the job during the hot weather.



Demand for Gas Ranges Set at 25 Million Units During Next 5 Years

New York

• • • **It is estimated** that the potential demand for gas ranges in the United States and Canada may exceed 25 million units in the next 5 years alone, according to the Gas Appliance Manufacturers Assn. More than 10 million gas ranges now in use are more than 10 years old. During the next 5 years 8 million more gas ranges now in use will become more than 10 years old and ready for replacement by new models.

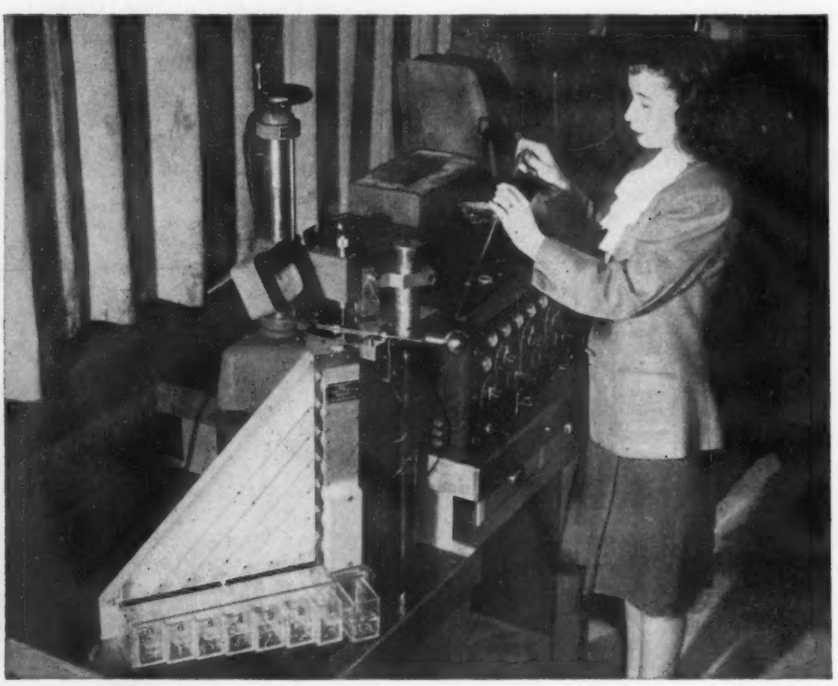
Automatic gas water heater manufacturers are expected to exceed their 1941 production of 800,000 units by 1.2 million, and to produce 2 million units in 1947. House heating equipment manufacturers are experiencing the greatest demand in their history despite shortages of materials which have prevented the erection of homes in volume, and shortages of pipe line and gas manufacturing equipment which prevented utilities from supplying the gas required for thousands of requests on dealers' sales books.

Despite the war period, which curtailed home building and main extensions, the number of homes using gas for cooking increased 46 pct in the past 10 years. Of the 7.2 million new gas cooking customers added since 1936, approximately 4 million were added to gas utility lines and 3.2 million through bottled gas distribution.

While it is impossible to estimate the number of new homes which will be built in the near future, the industry confidently expects a minimum of 1,250,000 new homes to use gas for cooking each year. When supplies of materials allow doubling and extension of existing pipe lines, building of new pipe lines, the expansion of manufactured gas production facilities, development of additional bottled gas distribution outlets, and new home building in volume, the gas industry expects to add new customers at a substantially greater rate.

Continuing fundamental research projects have already found means of reducing manufactured gas and distribution costs and of increasing the amount of gas produced from existing facilities. New discoveries of natural gas supplies, totalling 12 trillion cu ft in 1946 alone, have brought known reserves to 160 trillion cu ft. Indicative of the extensiveness of already-known natural gas supplies is the fact that new discoveries in 1946 were two and one-half times 1946 consumption. Exploitation and new drilling are unearthing additional large reserves every year.

PIN BALL WINNER: *No one ever loses on this industrial "pin-ball" machine which Violet Manion is running at the SKF Industries plant, Philadelphia. Balls are scaled to tolerances within 20 millionths of an inch by an electronic gage that sorts them into six varying sizes, rejecting misfits—all at the rate of 60 per min.*



1947 Porcelain Enamel Shipments Over 1946

Washington

• • • **Dollar value of** total shipments of porcelain enameled products for the first 4 months of 1947 were 155 pct of the total of the same period in 1946, and 256 pct of that for the same period for 1945, according to a report released by the Porcelain Enamel Institute, Washington, D. C.

Shipment values reported for porcelain enameled refrigerator parts in the first 4 months of 1947 were twice as great as the value during the same period in 1946, and fourteen times as great as in 1945. Washing machine parts values, compared on the same 4-month basis, were 2½ times as great in 1947 as in 1946; values for store fronts and other architectural porcelain enamel parts were more than twice as great in 1947 as in 1946; values for porcelain enameled reflectors, including fluorescent reflectors, were twice as great in 1947 as in 1945, and showed an increase of 42 pct over the figure for last year; and porcelain enameled sign values for 1947 were 16 times as great as in 1945.

Invites U. S. Businessmen To Attend Trade Fair

Washington

• • • **Announcement has** been made by the War Dept. that British occupation authorities in Germany have allocated 900 invitations to U. S. businessmen to attend a trade fair scheduled for Aug. 18 to Sept. 7 at Hanover, Germany.

About 2000 exhibitors from the combined American-British zones will have consumer, commercial and industrial goods on display at the fair, which is being held for the first time.

While visitors not on the authorized quotas cannot be guaranteed access to additional points in the American-British zones, every effort will be made to arrange further travel, it was said.

Weekly Gallup Polls . . .

Many Items in Taft-Hartley Bill Appeal to Public

Princeton, N. J.

• • • **Although President Truman** expressed strong disapproval of the Taft-Hartley bill, many of the bill's provisions meet with wide public favor, according to George Gallup, director, American Institute of Public Opinion.

The nation's voters have long expressed dissatisfaction with strikes, and at the time of the 1946 election campaign the public listed strike-control legislation as the most important issue before the country.

At least five of the major provisions of the Taft-Hartley measure are closely in line with public thinking. They are:

(1) The ban on the closed shop. The closed shop principle has never been popular with the American people outside labor unions. The majority feel that a worker should be free to join a union if he wants to, but that he should not be compelled to join a union in order to get a job.

A poll in January of this year, in which the closed shop, union shop and open shop were each described to voters, found that 8 pct favored the closed shop, 18 pct the union shop, while 66 pct favored the open shop, and 8 pct expressed no opinion. The general sentiment is reflected in the fact that some half-dozen states have passed laws banning the closed shop.

(2) Financial reporting by union. The idea of making unions financially accountable, by requiring all of them to report money they collect and spend, has wide public support. A poll last December found 84 pct of the general public in favor of such a requirement, and 80 pct of the union members included in the poll.

(3) Control of featherbedding or make-work policies. The practice whereby employers are required by unions to take on extra workers for a job, whether they are needed or not, is unpopular with the general public. A poll in 1946 found 60 pct in favor of prohibiting featherbedding.

(4) Waiting period before a strike. The general principle of a cooling off or delaying period, during which issues in a labor dispute are investigated, has overwhelming public support.

When President Truman first proposed cooling-off periods and fact-finding boards to help avoid strikes, a large majority of the general public, and seven out of every ten union members polled by the institute, were in favor of the proposal, at a time when union heads were denouncing it.

(5) Abolition of jurisdictional strikes. Voters familiar with the jurisdictional strike are more than 2-to-1 in favor of abolishing it by law, a poll in February found.

In one respect, public sentiment would go further than the Taft-Hartley bill in regulating unions.

The majority of voters favor a law to prohibit strikes in public utilities, such as electric power or gas companies. The bill does not go that far.

While wanting regulation of union practice, the public is not opposed to unions.

Many surveys have established the fact that a very substantial majority believe unions are desirable and beneficial, and that they are here to stay.

Moreover, there is widespread public sympathy for many of the wage demands of organized labor. In the recent telephone strike, an institute poll found more public sympathy on the side of the workers than on the side of the company. The chief reason was a feeling on the part of the public that telephone workers do not receive sufficient pay.

The average American has a lot of faults to find with the way employers and business managers handle their labor. A survey in April asked the public:

"What do you think are the chief faults of employers in this country?"

The four main faults in the opinion of the people are:

(1) They lack human understanding of the workers' problems.
(2) They don't pay enough wages but are greedy for profits.
(3) They make work hours too long and production requirements too stiff.
(4) They don't give enough recognition and reward of ability and hard work.

One Fifth in Index of Job Optimism See Possibility Of Unemployment Within Year

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• • • **One person in** every five in the nonfarm population of the United States thinks there is a chance that he or the breadwinner on whom the family depends will be unemployed within the next year.

That is shown in a coast-to-coast survey conducted by the institute as an index of job optimism in the United States today.

The most optimistic are the business and professional classes and the white collar workers. Manual workers are the least optimistic, the survey shows.

The job optimism index was arrived at by questioning a national cross-section, not including farmers, on the following:

"During the next year, do you think there is any chance that you (your husband) will be unemployed?"

The vote:

	Pct
Yes, there is	21
No, there isn't	63
No opinion	16

The 21 pct indicating a fear of becoming unemployed were asked:

"How great a chance is there—very great, fairly great, or only a slight chance?"

Their vote is:

	Pct
Very great chance	6
Fairly great chance	6
Slight chance	8
No opinion	1
	21

It will be observed that of the 21 pct, about half (12 pct) think there is either a great or a fairly good chance of unemployment. To

(CONTINUED FROM PAGE 140)

Railway Building Future Is Bright In Most Countries

Cleveland

• • • **Railways should** have a bright and growing future in foreign countries, E. G. Plowman, vice president in charge of traffic, U. S. Steel Corp., told a meeting of the Great Lakes Shippers Advisory Board here last week.

With the exception of western Europe, where little new construction will take place except replacements to repair the ravages of war, extensive railroad construction seems certain in China, Russia, Australia, South America, Africa, Canada and Alaska, he said.

He said these countries all have large areas that need the colonizing and industrial development that accompanies a pioneering railroad line, and there is hardly a country in the world that does not also have some mass production possibility lying dormant.

Predicting that railroad mileage outside the United States will probably double during the next 20 years, Mr. Plowman pointed out at the same time that many large railroad systems outside the United States are now nationalized.

"Probably the most important exception is the vast and privately owned and operated Canadian Pacific railway system in Canada," he asserted.

Mr. Plowman pointed out that there are also several privately-owned railroads in Brazil and although having only 15 pct of Brazil's railroad mileage, these roads are estimated to carry about one-fourth of the freight and passengers.

Pullman-Standard To Build 200 Cars for NYC

Chicago

• • • **The Chicago plant** of Pullman-Standard Car Mfg. Co. has started work on 200 new passenger cars for the New York Central System. The 200 car lot is one of the largest orders ever to go into production at Pullman-Standard for any single railroad. It will consist of 174 sleepers, 15 diners and combination diner-lounge and 11 train service cars. Pullman-Standard recently completed an order for 153 streamlined, stainless steel coaches for the New York Central.

Featured in the order will be four full length diners devoted entirely to seating, with the kitchen in an adjoining car. The main section of these cars will seat 24 people at tables for two, facing toward the center of the car, with upholstered settees against the walls. Intermediate sections have a private dining room effect, and seat 32 more patrons. The sleepers will include 45 all roomette cars, 97 combination roomette and bedroom cars, 14 all bedroom cars and 18 cars with bedrooms in combination with bar and lounge.

Exterior of the cars will be smooth steel sides, painted in dark gray with window panels in lighter gray, and the two shades separated by aluminum stripes.

Coming Events

July 14-18 **American Society of Civil Engineers,** Duluth, Minn.
Aug. 25-29 **National Assn. of Power Engineers, Inc.,** Boston.
Sept. 8-12 **Instrument Society of America,** conference, Chicago.
Sept. 10-12 **Porcelain Enamel Institute, Inc.,** Columbus, Ohio.
Sept. 17-26 **National Machine Tool Builders' Assn.,** machine tool show, Chicago.
Sept. 22-25 **Assn. of Iron & Steel Engineers,** annual meeting, Pittsburgh.
Sept. 29-Oct. 3 **American Gas Assn.,** San Francisco.
Oct. 2-3 **Gray Iron Founders' Society,** annual convention, Milwaukee.
Oct. 6-7 **Packaging Machinery Manufacturers Institute,** annual meeting, Springfield.
Oct. 16-17 **National Conference on Industrial Hydraulics** (formerly Hydraulics Machinery Conference), annual meeting, Chicago.
Oct. 18-24 **National Metal Exposition,** Chicago.
Oct. 31 **Illinois Mining Institute,** annual meeting, Springfield, Ill.
Oct. 30-Nov. 1 **American Society of Tool Engineers,** semi-annual meeting, Boston.

Says Portal-to-Portal Act Doesn't Outlaw All Future Portal Claims

Chicago

• • • **The Portal-to-Portal** Act of 1947, which became law on May 14, does not outlaw all future portal-to-portal claims, Attorney Ernest S. Ballard told the Business Problems School luncheon meeting of the Chicago Association of Commerce and Industry. "The only future claims that are outlawed," Mr. Ballard said, "are claims for travel and other preliminary activities before the employee commences his work day and for travel and other postliminary activities after he has finished his workday."

The speaker said that the law is unchanged during the work day and the Mount Clemens Pottery decision is still the law. Any activities that come within the decision's definition of work must be paid for and the time counted. An example, the speaker said, would be walking and incidental activities before and after lunch.

Although the Portal-to-Portal Act eliminates claims for preliminary and postliminary activities, there is a zone of activities which may be so indispensable to the principal activity as to be held an integral part of it, the assembly was told. Changing of clothes and sharpening of tools might, in certain instances, be in this category. Where this situation exists, "the only sensible course is to include the preliminary activity in the workday," the Chicago attorney declared. "This will increase the cost of production, but it will not increase it nearly as much as if a claim were created for time and a half the regular rate of pay plus a like amount as liquidated damages."

Industry Advisers Named

Washington

• • • **The State Dept.** has announced the selection of Harry B. Dyer, president, Nashville Bridge Co., and Harry B. Jordan, vice-president, Canal Barge Co., Inc., New Orleans, as industry advisers to the U. S. Delegation attending the International Congress of River Transportation. The Congress was scheduled to meet in Paris, France, June 26-28.

Increased Coal Allocations to Aid British Steel Industry

London

• • • **The British iron** and steel industry, which has been operating since the beginning of this year on a reduced coal allocation, will probably receive all the coal it needs this summer. This allocation will permit production this summer to equal that of the same period last year. The production for the last quarter of 1947 is at the rate of over 13 million ingot long tons annually.

Herbert Morrison, Lord President of the Council, gave this good news for the British industry at the latest of his series of press conferences. He had one or two other announcements of an encouraging nature to make, among them—(1) that coal stocks are higher, and mining manpower is steadily rising; (2) that steel sheet production is back to the January peak; (3) that output of passenger and commercial vehicles is touching all-time highs.

But his optimism throughout was tempered with caution and there was more than a hint of increased "austerity" ahead. For the home consumer the immediate outlook was none too bright—"no use pretending it is," said Mr. Morrison. The Cabinet, he revealed, is considering the overhaul of imports and an announcement can be expected before long. The balance of payments between imports and exports was in an extremely serious condition and must be improved.

Britain's economic position in heavy industry today as outlined by Mr. Morrison is as follows:

Steel. Shortage of steel has been threatening to replace the shortage of coal as the most crippling bottleneck. The government came to the conclusion that it would be justified in increasing the allotment of coal and coke to the iron and steel industry for the summer months. The object is to give the industry something like its full requirements in the summer, although there will be no guarantee that in all cases the coal will be available in precisely the right qualities at the right places.

Justification for giving the iron and steel industry additional fuel

Predicts Steel Production Will Reach 13 Million Long Tons Of Ingots in 1947

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can be seen in the supply position. The demand for steel continues to run at very high levels; a substantial quantity of steel output was lost because of the fuel crisis; steel output has been high in recent weeks, but at the expense of a serious running-down of stocks of pig iron and scrap; even if the industry is now able to produce at near maximum output, the amount of steel available in the summer will inevitably continue to fall below demand while imports are low.

It is expected that the broad effect of the increased supplies of fuel will be that in the summer months, after allowing for the effect of holidays, the industry will be able to produce at about the same rate as was achieved over the whole of 1946—namely, at about the rate of 12.7 million ingot (long) tons.

It is hoped sufficient fuel supplies be given to the industry in the winter months to push production in the last quarter of the year up to a rate of well over 13 mililon ingot tons. "There are, as the Minister of Fuel has stated and as I repeat and emphasize, factors of uncertainty in the coal position," said Mr. Morrison, "But the government has made a venture of faith in order to give the steel industry the chance to run full-out.

"What we have said is that it is better to budget for expansion than to budget for restriction. It is essential that the practical effects of this step should not be misunderstood. Even in terms of the output of the home steel industry, it will be some time before the fuel increases have an effect upon deliveries of steel. But in any case the chief factor at the present time in our steel shortage is not home output. This has been running close to capacity since the war and will soon be brought still nearer to it again.

"Incidentally, I commend this point to the special attention of those who like to talk as though Britain was suffering from some sort of creeping paralysis. The trouble with steel is that maximum home production is still not enough to meet the absolutely unprecedented demands for reconstruction, for re-equipment, and for the export drive which are the aftermaths of war.

Our home capacity is only about four-fifths of our present need, and imports go only a little way to fill the gap. Total home capacity can increase but slowly, imports from abroad cannot in present conditions grow fast. That is why the shortage must continue and why no steel user should be misled into expecting the fulfilment of his unsatisfied demands for quite some time to come."

Coal—Coal stocks on June 14 stood at 8.4 million tons. When the new coal year opened on May 1 stocks were down to less than 6 million tons. The target for the end of October in readiness for the winter is 15 million tons. Of this gap of 9 million tons, 2½ millions were filled in about the first 7 weeks, with about 19 weeks to go. The effect of the holiday period during the next two or three months is still uncertain, but output is not going badly.

The figure of manpower in the mines is creeping steadily up and at the end of the first week in June stood at 717,000, compared with an average of the 5 weeks of May of 715,000.

British Tax Reduction

London

• • • **The British Exchequer** has abolished the purchase tax on a range of domestic appliances on which 66 2/3 pct was imposed last April. Gas and electric stoves, boiling rings, grillers and hotplates, electric tea kettles, irons and wash boilers are now all completely exempt from purchase tax. Mr. Dalton is also considering whether or not to retain the tax on refrigerators, vacuum cleaners and washing machines. Gas and electric stoves remain subject to tax in the interests of fuel economy.

Standards Are Studied As Means of Reducing Costs in Buyers' Market

New York

• • • **Higher production costs** and prospects of a shift from a sellers' market to a buyers' market are causing management to consider industrial standardization as a means for turning out a quality product at the lowest price compatible with satisfactory performance, according to a survey recently completed by the National Industrial Conference Board. Renewed interest in industrial standardization, the study points out, can be traced in part to industry's experiences in war production, which required general use of "the best techniques, methods and materials, simplification of design to reduce the number of parts, models and varieties, and maximum interchangeability."

The conference board survey, however, stresses the peacetime potentialities of this management "tool." It points out that industrial standards can promote general usage of the best methods, materials, processes, or products. Also, concentration of productive effort on a simplified line of standard products "permits management to realize the economies of repetitive mass production."

The study mentions additional benefits such as "better and quicker servicing of customers, smaller inventory requirements from manufacturer to retailer, and closer coordination between the purchasing, engineering, manufacturing, and sales departments of the company through joint consideration of standardization proposals affecting all groups."

The perils of premature or hastily conceived standardization are explored in the survey. Both industrial and military leaders point out the dangers of hamstringing development work by "freezing" designs too early. Germany standardized air craft design early in the war, it is pointed out, and while production benefited, technical superiority passed to the Allies, who constantly changed and improved their basic designs.

The study suggests that wider application of simple performance standards "be encouraged as a substitute for detailed and rigid specifications as, for example, in the building materials field." The kind of standardization practiced in the automobile industry, where parts are standardized but the final product is not, is mentioned also as an illustration of the "wise use of standards."

Individual company standardization programs, the study notes, are concerned primarily with technical standards, such as dimensional characteristics, performance ratings, and materials specifications. Of the 93 companies covered by the survey around one-third reported that they have formal standards departments. Most of the others, however, report that they are participating in standardization work both within their own companies and in cooperation with industry-wide and national organizations.

Functions of the standards department are indicated by the following outline based on the conference board survey of 93 companies:

(1) Develop procedures for investigating, preparing, approving and distributing standards.

(2) Maintain constant surveillance over current practices within the company in order to (a) revise existing standards in light of new developments, (b) to check unjustified departures from standard, and (c) to avoid underexpansion of product line in cases where needs can be filled satisfactorily from existing line.

(3) Represent the company in standardizing activities of the industry, trade associations, technical societies, and national standards organizations.

(4) Keep the company informed on new standards or proposed standards of other companies and standard groups.

(5) Coordinate and reconcile divergent views of different departments on existing and proposed standards.

(6) Publicize the benefits of standardization to design, manufacturing, and sales executives. At the same time, unsound standardization should be discouraged.

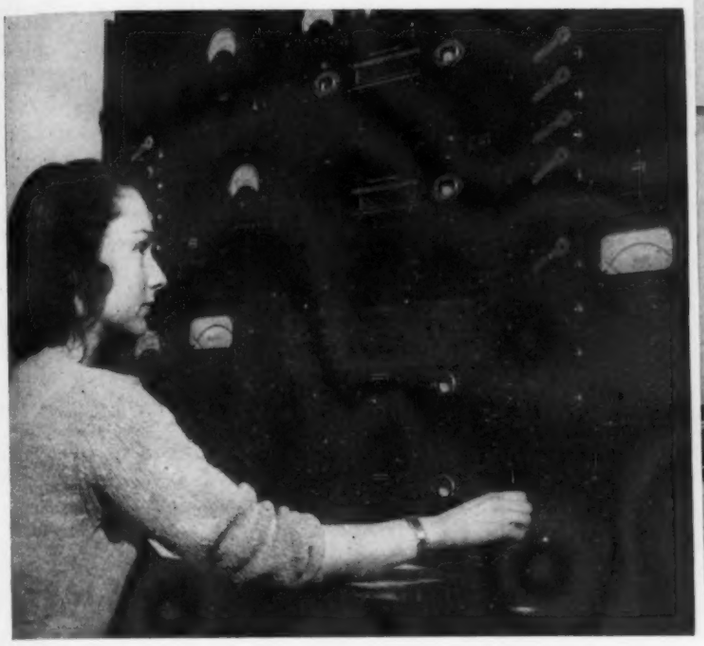
(7) Act on requests of others for new standards or revisions of old ones; if necessary, initiate desirable standards project.

Blast Furnace Capacity and Production—Net Tons

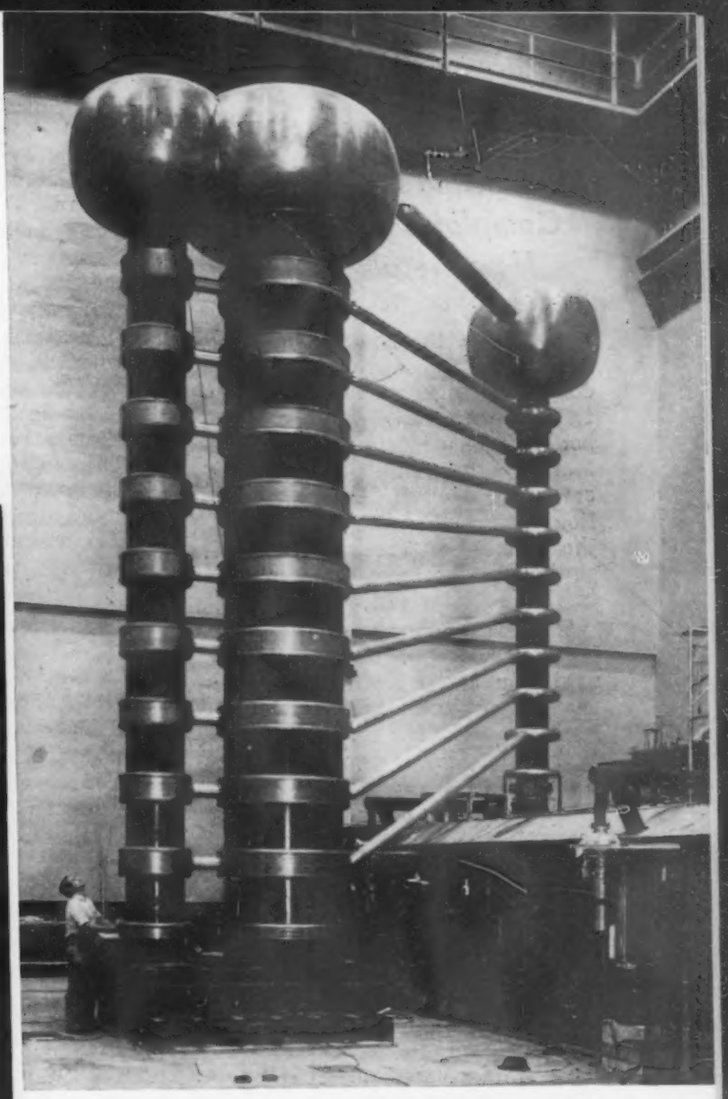
	Number of Companies	Annual Blast Furnace Capacity	PRODUCTION							
			PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL			
									Pct of Capacity	
			May	Year to Date	May	Year to Date	May	Year to Date	May	Year to Date
DISTRIBUTION BY DISTRICTS:										
Eastern	11	12,551,280	947,414	4,562,428	26,438	128,289	973,850	4,690,717	91.3	90.3
Pittsburgh-Youngstown	16	25,042,040	2,024,250	9,653,037	12,545	70,737	2,036,795	9,723,774	95.7	93.8
Cleveland-Detroit	6	6,557,500	531,763	2,540,271			531,763	2,540,271	95.4	93.6
Chicago	7	14,097,710	1,003,698	5,137,536			1,003,698	5,137,536	83.8	88.0
Southern	8	4,924,670	331,026	1,620,009	9,225	45,850	340,251	1,665,859	81.3	81.7
Western	4	2,536,000	191,345	901,065	3,429	11,297	194,774	912,362	90.4	85.9
Total	36	65,709,200	5,029,496	24,414,346	51,635	256,173	5,081,131	24,670,519	91.0	90.7

Source: American Iron & Steel Institute

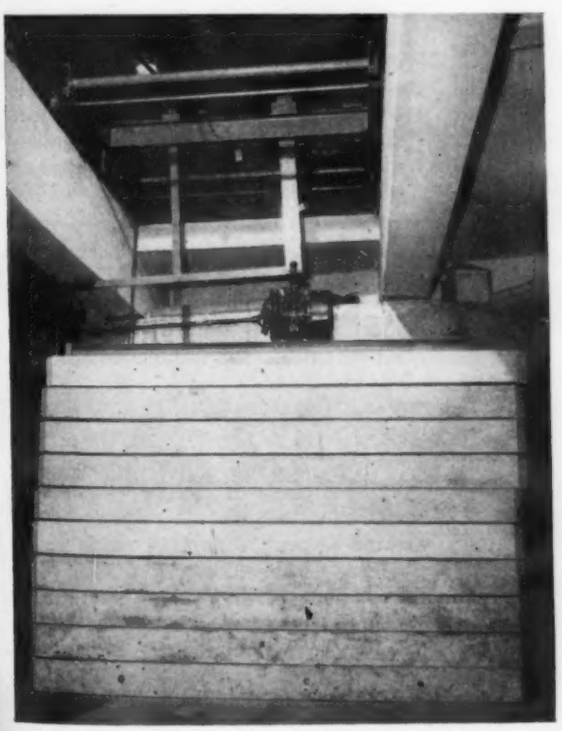
Bureau of Standards Studies Concrete For X-Ray Protection



INDUSTRIAL uses of million volt X-rays, particularly the broad beam type, increased tremendously during the war but almost nothing is known of how the beam scatters. This is the central control station of the unit the Bureau is using to study potential hazards of the new technique.



X-RAY unit at the National Bureau of Standards, above, can deliver 25 milliamperes at 1,400,000 v. Field attempts to study effectiveness of concrete and lead protection can't approach laboratory conditions.



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SLABS of accurately determined cement mix, left, 6-in. thick and weighing 2½ tons, are placed over the mouth of the radiation pit. Where space and weight are to be considered, lead sheets are sandwiched between the slabs. At right, the target end of the X-ray tube, located in the main chamber of the laboratory, extends into the heavily insulated target room. Electrons, accelerated down the 28-ft X-ray tube, strike the target and cause it to emit rays that are directed downward through the concrete barrier into the radiation pit where penetration can be measured.

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Carburizing Committee Completes Articles For New Metals Handbook

Cleveland

• • • **Six of the** nation's foremost authorities on carburizing have completed their preparation of articles for the 1947 Metals Handbook of the American Society for Metals, soon to be published, according to W. H. Eisenman, national secretary who made public the names of the metallurgical engineers who have been engaged in this activity since 1940.

The ASM committee on carburizing consists of R. B. Schenck, chairman, Buick Motors Div., General Motors Corp., Flint, Mich.; F. E. Harris of the same company; J. A. Dow, Dow Furnace Co., Detroit; H. W. McQuaid, metallurgical consultant, Cleveland; R. G. Peters, Warner Gear Div., Muncie, Ind., and Gordon T. Williams, Pratt & Whitney, East Hartford, Conn.

Members of the committee have written eight articles on the various methods of carburizing steel parts. The committee has carried forward the work of previous ASM committees that have prepared material on this subject for all previous editions of the Metals Handbook during the past 20 years.

Pack carburizing, liquid carburizing and gas carburizing are discussed and specific recommendations are given for the selection and heat treatment of steels for carburizing. The mechanism of carburizing is described and methods for determining the depth of carburization are outlined.

The 1947 Metals Handbook will be distributed to more than 21,000 members of ASM in the United States, Canada, Europe, Asia and South Africa.

To Finance S. African Firm

London

• • • **Vickers, Ltd.,** and Associated Electrical Industries, Ltd., have concluded an agreement under which they will each participate financially in Vanderbijl Engineering Corp., Ltd., of Vanderbijl Park, near Johannesburg, South Africa. Vanderbijl Engineering Corp. has been set up to engage in the manufacture of mechanical engineering plant and equipment.

Associated Electrical Industries, through its subsidiary, the Metropolitan-Vickers Electrical Co., has also acquired the equity of L. H. Marthinusen, Ltd., electrical engineers, of Johannesburg, and it has been further agreed that "Vecor" will acquire an interest in the latter company. The object of these arrangements, it is stated, is to assist the future development in South Africa of the mechanical and electrical engineering industries.

Washington Comment

[CONTINUED FROM PAGE 86]

fice under the new Lanham Trademark Act which becomes effective July 5.

For the first time, provision is made that under certain defined conditions a registered mark may become incontestable. In brief, after a 5-year period of continuous use, the registration certificate may become conclusive evidence of the registrant's ownership and of his right to its exclusive use.

Thus, after July 5, no one in good faith may adopt and use a trademark that has been previously registered under the acts of 1881 and 1905, or that is on the principal register under the new act—having been filed before to July 5.

Also for the first time, the statute provides for the assignment of trademarks with only that part of the business in which they are used. More specifically, a valid sale or assignment of a mark no longer requires that an entire business be transferred at the same time.

Moreover, the act accepts the modern trend of trademark use and ownership by subsidiary companies —referred to in the act as "related companies." It is now possible for a parent company to register a trademark that is used by one or more of its subsidiaries.

Present trademark owners may convert their present registrations merely by filing an affidavit with the Patent Office. The mark will then be republished and incontestability may be claimed after the 5-year period.

Not the least important is a provision which the Patent Office requested to assist it in keeping the register clear of marks which are not in actual use. It requires that every owner of a trademark must file a so-called affidavit during the sixth year after the date of publication or republication. If such a statement is not filed, the mark will be canceled.

TWODECKER TRANSPORTS: *The first 80-passenger Boeing Stratocruisers are nearing completion at the company's Seattle factory. Sections of the military version may be seen in the left background bearing the Air Forces insignia.*

MDNA Head Says Paper Work Has Retarded WAA Sales

Cincinnati

• • • **More than** $285 million worth of surplus machine tools at acquisition cost have been sold by approved members of the Machinery Dealers' National Assn., Harvey H. Goldman, MDNA retiring president, told members at their sixth annual convention here recently.

"If War Assets Administration had been in position to clear its paper work and make prompt deliveries and show some semblance of a businesslike approach to the problem, dealers could have sold several times this amount," he declared.

"From everything we can learn, in order to quickly clear out plants and warehouse facilities, the government is going to be forced to dump a certain amount of equipment on the market. They are not calling it dumping but the effect will be the same on the machine tool market. One thing is certain—there are such conflicting opinions as to the amount of standard general purpose tools yet to become available from government stores, that until the picture is clarified it would seem that discretion should become the order of the day."

Mr. Goldman said that WAA is becoming "disturbed at a number of practices and developments which it feels are unfair to the agency, to the government and to the public." He cited: Paying of commissions and discounts to dealers for selling machine tools for which there is an active demand; considerable criticism is developing as a result of WAA site sales, with their attendant confusion and discrimination; a lack of cooperation on the part of dealers by selling tools that are readily saleable and not paying enough attention to tools that actually are in long supply, and pressure by dealers on WAA in an effort to get machine tools they desire.

According to Mr. Goldman many of these conditions are serious enough for grave concern, not only on the part of WAA, but of the machine tool industry as a whole . . . "the surplus problem is a matter of tremendous concern to this industry, and because it will affect us longer than any other segment of business, it is absolutely necessary for us to remain in the picture until the very end of the program."

The Industry Advisory Committee, Mr. Goldman added, established by the WAA early in 1946, and composed of builders, distributors and used machinery dealers, deteriorated into "a listening post for WAA," the agency making decisions and then calling in the committee to see what it thought about them.

"If we agreed," Mr. Goldman said, "the WAA went ahead; if we didn't agree, they went ahead anyway. It has been only through informal meetings with WAA officials that we have been able to at least keep in touch with the program (of surplus machine tool disposal) and thus do our best to see that it is directed into the proper channels."

The MDNA president said that at the peak of the program there was in excess of 3200 approved dealers; this group has since been cut down to approximately 1600.

"Most of this loss of valuable selling power was due to the difficulties with which we dealers were faced in attempting to do business with the govermnet," Mr. Goldman said.

Group Sold $285 Million Of Surplus Machine Tools; Warns of Dumping

° ° °

MDNA Elects

Cincinnati

• • • New officers elected at the convention are: George McClennen, Delta Equipment Co., Philadelphia, president, succeeding Harvey H. Goldman, Harvey Goldman & Co., Detroit; Ralph Hochman, Ralph Hochman & Co., Newark, N. J., first vice-president; Joseph T. Weiss, Interstate Machinery Co., Inc., Chicago, second vice - president; and Charles Simmons, Sr., Simmons Machine Tool Corp., Albany, N. Y., treasurer. Randolph K. Vinson, Chicago, is executive director.

The board of directors for 1947-48 is composed of the officers and the following: Sam Barron, Barron Machine Co., Chicago; John Green, Lafayette Machinery Co., Detroit; Harry King, King Machinery Co., Los Angeles; Nathan Lee, Nutmeg State Machinery Corp., New Haven; Henry Wehrheim, Wehrheim Machine Co., Newark; Frank J. Lunney, Philadelphia; Joseph Hurwitz, Cook County Machinery Co., Chicago; J. Lee Hackett, J. Lee Hackett Co., Detroit; David Kriser, New York; Philip R. Noll, Noll Equipment Co., Cleveland; Thomas J. O'Brien, O'Brien Machine Co., Philadelphia; Fletcher Bennett, Bennett Machine Co., New York.

Concrete Finished On Huge West Virginia Coal Washing Unit

Pittsburgh

• • • **A $1 million project** for one of the world's largest coal washing plants has been completed for McNally-Pittsburg Mfg. Corp. by the Rust Engineering Co., of Pittsburgh, Pa.

The work is part of the new high-capacity, modern treating plant being installed by McNally-Pittsburg at the Gary, W. Va., mine of U. S. Coal & Coke Co.

Concrete construction includes a 12,500-ton blending bin, one of the largest structures of this type ever built, and a 6000-ton raw coal bin, both built using sliding forms; a combined refuse bin and suspension bridge anchorage; a domestic coal bin; foundations for preparation building; bridge piers; extensions to two mine dumps, and Barney coal haul, railroad car dump and transfer house.

To pour the huge amount of concrete required, without interrupting existing coal handling operations in the plant's narrow valley site, Rust erected a mixing plant a mile and a half away and 19,950 cu yd of concrete were hauled to the site in ready-mix trucks.

Industrial Briefs . . .

• NEW BOILER PLANT — The board of directors of Empire Steel Corp., Mansfield, Ohio, has announced the near completion of a new $250,000 boiler plant and also provisions for an expenditure of $60,000 for burner and oil storage tank facilities as standby equipment in case of further natural gas curtailment during the winter months.

• BUILDS PILOT MODELS — Warner & Swasey Co. is commencing the construction of five pilot models of the American version of the Swiss Sulzer weaving machine for which they have the American manufacturing rights.

• OPENS DISTRICT OFFICE — Thomas Steel Co., Warren, Ohio, has announced the opening of a district sales office at 20 Pine St., New York, with Hugh J. Smith in charge.

• MANUFACTURERS EVERDUR — Federated Metals Div., American Smelting & Refining Co., has announced that it has been licensed to manufacture and sell "EVERDUR," a patent silicon bronze alloy originally produced and sold by the American Brass Co.

• SALES OFFICE — Monsanto Chemical Co. has opened a new sales office for the State of Texas with headquarters in Houston. The new office will handle the company's products other than phosphates and plastics, and Harvey M. Harker has been appointed general branch manager.

• DIVERSIFIED—Atlas Welding Co. of Canton, Ohio, has added a new line of products. They are now making stainless tubs and carts for meat packers. The company is also considering the manufacture of 50 gal drums to be used as large containers, and this product will also be made of stainless.

• EXPANDS PLANT—The Facilities Review Committee of the Office of the Housing Expediter at Washington has approved proposed construction of four buildings at the National Aniline plant of the Allied Chemical & Dye Corp. in Buffalo at an estimated cost of $1,317,888. The new buildings will be used for the manufacture of synthetic detergent antioxidants and naphthol dyes.

• ANNIVERSARY — Illinois Tool Works, Chicago, celebrated the 35th anniversary of the founding of the company on June 2. Special ceremonies featured recognition of 54 employees, 50 men and 4 women, who have completed 25 or more years of service with the organization.

• MORE WIRE—The Maryland Fine Wire & Specialty Co. has completed a new building in Baltimore to expand their production of wire items. Much of the new facilities will be devoted to the manufacture of fine wire, florist wire and similar items.

• TURBO-POWER — Allis-Chalmers Mfg. Co., Milwaukee, has announced the formation of a new turbo-power development department in its engineering development division. R. C. Allen has been named manager and chief engineer of the new department. The new department will particularly pursue turbo-power developments for ships, locomotives and stationary plants. One project currently underway is the 3750 hp coal burning locomotive gas turbine being constructed for the locomotive development committee of Bituminous Coal Research, Inc,

• STARTS PRODUCTION — Sierra Drawn Steel Corp., Los Angeles, has begun production of cold-drawn steel in a newly constructed building. Annual capacity is about 10,000 tons. F. J. Robbins, president, is also vice-president, Plomb Tool Co.

Harry Saxer Has Retired From J&L Steel Corp.

Pittsburgh

• • • **Harry Saxer,** general superintendent of the Aliquippa Works of the Jones & Laughlin Steel Corp., announced his retirement as of June 30, 1947. His retirement completes a career of more than 47 years in the steel industry—more than 40 years with Jones & Laughlin, and the longest tenure of office as general superintendent of the Aliquippa Works in the history of that plant.

Harry Saxer

After attending Allegheny High School, Mr. Saxer went to work for the American Steel & Wire Co., where he worked for 7 years in the blast furnace department.

In 1914 he was made superintendent of blast furnaces at the Aliquippa Works of Jones & Laughlin Steel Corp. In 1923 he was made superintendent of the blast furnace and coke works and in 1926 the by-product coke works was put under his direction. In 1927 he was made assistant general superintendent of the Aliquippa Works, and in 1930 Mr. Saxer became general superintendent.

Coke Oven Contract Let

London

• • • **Contract for the** construction of the coke-oven and byproduct plant at their Margam works, Port Talbot, South Wales, has been placed by Guest, Keen, Baldwins Iron & Steel Co., Ltd., with Simon-Carves, Ltd., Cheadle Heath, Lancashire. Sixty new ovens built in batteries of 15 are to be added to the 54 ovens existing, raising the through-put to 2000 tons of coal a day. The contract covers coke handling and screening plant, a 2000-ton coal bunker, a new system of conveyor loading, and complete byproduct recovery plant. A further 45 ovens will be added later. The contract forms part of the Margam reconstruction program.

Construction Steel . . .

• • • **Fabricated steel awards** this week included the following:

1800 Tons, Socony-Vacuum Oil Co. storage tanks at Paulsboro, N. J., to Grover Tank & Mfg. Co.

1000 Tons, States of Ohio and Illinois, acidulating building for Swift & Co., to Mississippi Valley Structural Steel Co., Decatur, Ill.

850 Tons, Niagara Falls, Carborundum Co. maintenance building, Turner Construction Co., general contractor, to Bethlehem Steel Co., Bethlehem.

500 Tons, Navy Yard, Philadelphia, extension to turbine testing laboratory, to Lehigh Structural Steel Co., Allentown, Pa.

200 Tons, Milford, Ill. three state highway bridges through States Improvement Co., Chicago, to Duffin Iron Works, Chicago.

150 Tons, Luzerne County, Pa., bridge reconstruction on route 40117, section 1-A, Pennsylvania Dept. of Highways to Pine Iron Works, Pine Forge, Pa., previously reported in the June 12 issue was in error.

120 Tons, Tania, Iowa, bridge repair for the Milwaukee R.R., to Joseph T. Ryerson & Son, Inc., Chicago.

100 Tons, Bloomfield, Iowa, Davis county project No. 50 to Pittsburgh-Des Moines Steel Co., Pittsburgh.

• • • **Fabricated steel inquiries** this week included the following:

1550 Tons, Chicago, addition to the University of Illinois Hospital has been abandoned.

1200 Tons, Indianapolis, State of Indiana, White River generating station for Indianapolis Power & Light Co.

1100 Tons, Milwaukee, building for Evinrude Motors Co. has been abandoned.

1090 Tons, Portland, Colo., a kiln building for the Ideal Cement Co., Denver.

850 Tons, Billings, Mont., main catalyst structure for Carter Oil Co.

670 Tons, Chicago, store building for Sears Roebuck Co.

600 Tons, Alaska, highway bridge, the Alaska Road Commission.

500 Tons, Columbus, Tex., highway span, Texas State Highway Dept.

110 Tons, Pennsylvania State Highway Dept., Harrisburg, repairs to Bradford County Bridge, bids to July 11.

100 Tons, State of Minnesota, national guard building M.

100 Tons, Omaha, Neb., auditorium for Boys Town.

• • • **Reinforcing bar awards** this week included the following:

1500 Tons, Mississippi River Locks No. 27, through River Construction Co., general contractors, to Carnegie-Illinois Steel Corp., Pittsburgh.

250 Tons, Cook County, Ill., bridge section 192-2525.1 Thomas McQueen of Forest Park, Ill., contractor, to Joseph T. Ryerson & Son, Inc., Chicago.

200 Tons, Cook County, Ill., bridge section 066-0505.3 Thomas McQueen, contractor, to Carnegie-Illinois Steel Corp., Pittsburgh.

115 Tons, Milford, Ill., three state highway bridges, States Improvement Co., Chicago, contractor, to Joseph T. Ryerson & Son, Inc., Chicago.

100 Tons, Waterloo, Iowa, building No. 168 for the Rath B. Packing Co. through Miller Construction Co. to Ceco Steel Products Co., Chicago.

• • • **Reinforcing bar inquiries** this week included the following:

2000 Tons, Chicago, Kostner Ave. sewer project, City of Chicago.

200 Tons, Chicago, building addition rotogravure plant for R. R. Donnelly Co. Peter Hamlin Co., Chicago, low bidder.

190 Tons, Chicago, the Powers Building, Carl E. Erickson, low bidder.

• • • **Sheet piling inquiries** this week included the following:

1650 Tons, Sault Ste. Marie, Mich., power house, Coffer Dam for U. S. Engineers, United Construction Co., Winona, Minn., low bidder.

• • • **Railroad car awards** this week included the following:

American Car & Foundry Co., New York, has received an order from the Western Fruit Express Co. for 400 40-ton refrigerator cars. The cars will be built at the ACF Chicago plant.

American Car & Foundry has been awarded 100 50-ton 42 ft all steel gondolas and 200 50-ton 40 ft 6 in. box cars by the Chicago, Indianapolis & Louisville Ry.

• • • **Railroad car inquiries** this week included the following:

The Pullman Standard Car Mfg. Co. has received an inquiry for 200 to 400 35-ton box cars and 150 to 300 35-ton stock cars.

Bureau of Standards Approves Revision Of Pipe Fittings Specs

Washington

• • • **The proposed** revision of Simplified Practice Recommendation R185-42, Pipe Fittings, has been approved, according to the Div. of Simplified Practice of the National Bureau of Standards. The revised recommendations will be identified as R185-47, Pipe Fittings, and will be effective from Sept. 1, 1947.

The original recommendation became effective Jan. 1, 1942, and subsequently served as the basis for mandatory orders issued by the War Production Board. Following revocation of the last of these orders, the industry, in cooperation with the Div. of Simplified Practice, drafted a revision, the purpose of which is to retain on a voluntary basis a standard of practice for these products.

The revision applies to gray cast iron, malleable iron and brass or bronze fittings. Fittings to which the recommendation does not apply are listed. As finally adjusted, the proposed revision now includes a comprehensive group of fittings required for sprinkler systems, in addition to the regular lines for other purposes. The section dealing with brass or bronze fittings has been adjusted to provide for sectional, as well as general, needs.

Although it has been found necessary to increase the number of fittings which formerly comprised the simplified list, the items retained will still represent a substantial reduction from the number formerly listed.

Printed copies of the revised recommendation will be available on or about Sept. 1. Pending printing, mimeographed copies may be obtained from the Div. of Simplified Practice, National Bureau of Standards, Washington 25, D. C.

See $2 Billion Added To Building Demand

Washington

• • • **President Truman** on June 30 signed the new Housing and Rent Control Act, charging in a sharply worded message that not only had Congress virtually wrecked the government's attempts to provide adequate housing and contributed to inflationary dangers but that "'private industry has not and cannot do the [housing] job without government aid."

A special target of White House criticism was the removal of restrictions on all construction except for amusement and recreation which still require OHE approval. This, it has been estimated by Housing Expediter Frank R. Creedon, will loose more than $2 billion worth of pent-up commercial construction demands on the building materials industry, already suffering from materials shortages.

In addition to allowing the 15 pct "voluntary" rent increases, the new law removes rent controls on new houses, hotels, remodeled and other similar housing. The act extends the OHE and remaining controls until Mar. 1, 1948.

Reopens Bids on Plant

Washington

• • • **Negotiations for** purchase or lease of Consolidated-Vultee's $10 million plant No. 2 at San Diego have been reopened following rejection by WAA of all previous bids as inadequate. The disposal agency did not announce the amounts offered in the rejected bids for the plant which includes 10 steel-frame buildings containing 1½ million sq ft in floor space. Inspection arrangements may be made through the Los Angeles WAA office.

MACHINE TOOLS

. . . News and Market Activities

Outlook for Third Quarter Machine Tool Orders Not Too Bright

• • • **Machine tool builders'** third quarter prospects are not particularly bright, despite the fact that June was expected to prove the pivotal month in new firm orders, according to qualified sources in the trade.

In some sectors, ordering has been jeopardized by the threat of a coal strike July 8, and the curtailment of steel production now in effect has already made some segments of the trade bearish on summer prospects. Heavy cancellations in May have also been a factor.

Some observers believe there will be no sustained demand for machine tools until the fourth quarter, some 30 days following the machine tool show. Others look for a slight acceleration in new firm orders in the third quarter, and in fact, a small general demand is being registered in some sectors, at the present time.

Grapevine reports suggest that many manufacturers are going ahead with tooling at least on a quotation basis, but are withholding orders until the labor atmosphere clears. In many cases the balance is very delicate, and labor difficulties could easily upset the applecart.

Recent price increases by major segments of the trade forced in quite a bit of business, and with price increases still to come from other producers, some additional ordering will probably result. Price increases have been pretty well accepted and bad reactions have been at a minimum.

In Detroit, machine tool activity is spotty. Some segments of the industry report a good volume of inquiries, although the amount of new business being placed is below normal. Other suppliers indicate that the majority of inquiries are for desirable surplus equipment and new standard equipment is very slow.

One encouraging development is a modernization program by Oldsmobile at Lansing, Mich., which is said to aggregate $1,500,000.

Clouded Labor Atmosphere Is Causing Some Companies To Withhold Orders

o o o

Conversation in Detroit that the Detroit Transmission Div. expansion plans may remove operations to Cleveland has subsided somewhat in favor of the U. S. Naval buildings on Mound Road. No official decision has been announced by General Motors.

Detroit tool and diemakers have come to their own defense in answer to statements that tool and die costs have jumped several hundred per cent since before the war. Admitting that tooling costs have gone up significantly, die producers are pointing out that auto companies are specifying more complicated dies than ever before. Automatic ejection, for example, is an added feature of most auto dies today that was not required before the war. Deeper draws are being sought. If identical dies were being specified today that were ordered in 1941, diemakers assert, costs would not have advanced more than 60 to 80 pct.

This same trend is evident in machine tools also, according to some sources. The single purpose machine seems to be definitely on the way out; what is required today most suppliers of tools believe is a completely engineered machine to do a specific job. This machine is necessarily more complex and higher in cost than standard machines performing a single function, it is asserted.

Evidence is growing here that the changes in appearance and mechanical construction of the 1948 model Ford will be substantial. According to the automotive tool and diemakers, however, little of the production tooling appears to have been released as yet. According to most sources, Ford is making a special effort to simplify die designs in order to achieve economy.

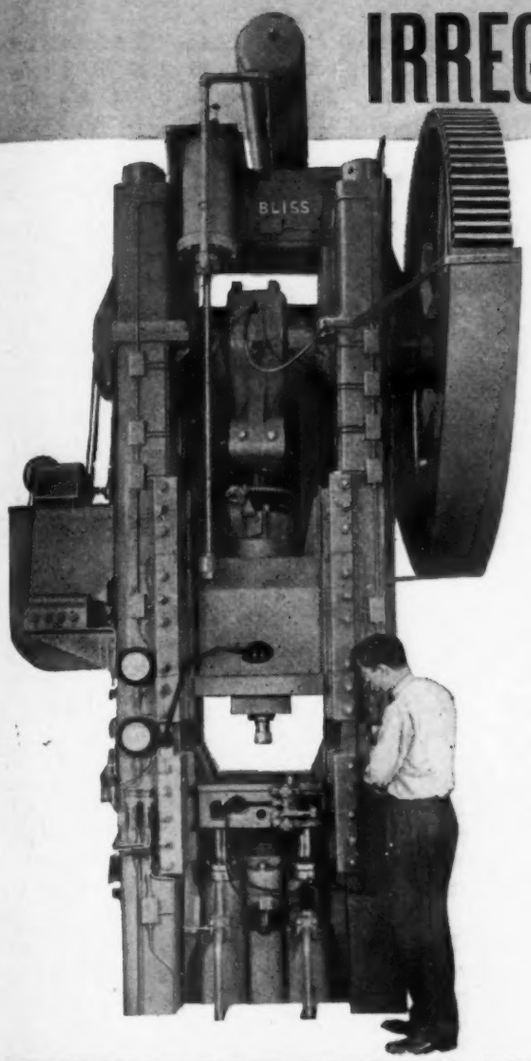
Contract tool and die shops, particularly in the Cleveland area, are traveling in high gear, but pretty largely on backlogs. Some segments of the trade would like some more orders, but are not looking for much of a pickup before September. While there has been a minor decrease in sales invoiced, the contract tool and die business has been holding up very well, and preliminary reports on the first quarter of 1947 show about a 10 pct increase over the corresponding period last year. April reports show a very light drop, about 1 pct. At the same time, there are indications that productivity is increasing, although sales invoiced have not reflected the increased hourly rates, according to authoritative sources, and the price of tooling and die work has been holding about the same.

Machine tool builders in Cincinnati report that the market is "quiet" and some sources indicate that new foreign orders cover about 50 pct of total orders coming in today and that there are still orders on the books from foreign sources that keep them busy. Another builder indicated that foreign business constituted approximately 30-35 pct of total orders.

Foreign business depends largely, this builder indicated, on the American dollar exchange available. All the industry here favors both the reduction of the tax and the Taft-Hartley bill, and while some sources indicated that there could be trouble expected with some labor factions, primarily coal miners, most seemed to feel that the machine tool industry's labor picture was good and would remain so.

New models of tools being designed and built for showing in September will probably be introduced on the market as soon as they are off the production line, one builder commented. He indicated that while there will be new models at the show, he did not feel the designs were going to be held till the show.

NEW BLISS BRIQUETTING PRESS EXTENDS METAL POWDER APPLICATION TO LARGE, IRREGULAR CROSS-SECTIONS



Complex powder metal parts beyond the size range and capacity of available single-action mechanical or hydraulic presses can now be produced to close tolerances in this new Bliss No. 309 Briquetting Press. Developed in cooperation with a large powdered metal parts fabricator, the press employs a unique operating principle which combines the advantages of triple hydraulic lower motion—floating die table, core rod and stripper—built into a 345-ton mechanical press.

Uniform density throughout the finished part is assured by the hydraulically controlled floating die table and core rod rams which recede against pre-determined pressure by simple, independent adjustments. This has the effect of squeezing the powder from the top and bottom. Many combinations of the three lower motions are made possible by flexible electric timing devices. Table and core rod can be kept stationary if desired. A variable speed motor and two-speed gearing provide 6 to 18 strokes per minute.

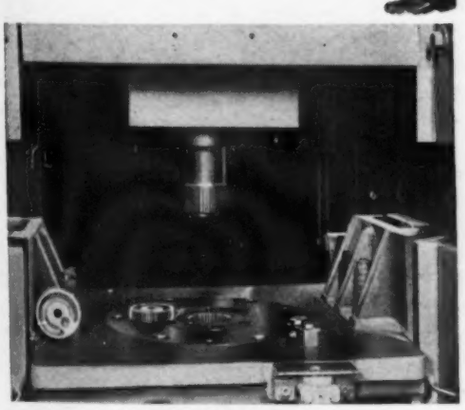
Once set up, the press is easy to operate. A hopper feed arrangement automatically fills the die and ejects the previously finished piece.

Tell the nearest Bliss sales representative about your metal powder equipment needs. Recommendations will be made without obligation.

E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Can and Container Machinery

WORKS AT: Brooklyn, N. Y.; Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Derby, England; St. Ouen sur Seine, France • SALES OFFICES: Detroit; Brooklyn; Cleveland, Dayton, Toledo, Ohio; Lansing, Mich.; Chicago; Philadelphia, Pittsburgh, Pa.; Rochester; New Haven; Boston; Toronto.



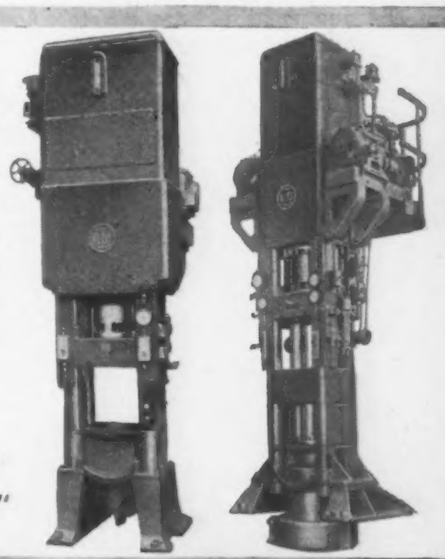
SPECIFICATIONS

	CAPACITY	STROKE*
Slide	345-ton	10"
Core Rod	60-ton*	3¼"
Stripper (eject up)	75-ton*	6"
Die Table	120-ton*	3"

*adjustable

Bliss also builds other special multi-action hydraulic presses for metal powder products. Shown here are two 200-ton presses: one a single action machine, equipped with hydraulic ejector, and the other a duplex press which provides simultaneous squeezing by two slides with independently controlled speeds and adjustable pressures. Lower slide also acts as an ejector.

SEND FOR COPY OF *"PRESSES FOR POWDERED METAL PRODUCTS"*



BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY

STAY AHEAD WITH *Bliss*

NONFERROUS METALS

. . . News and Market Activities

Tin Increase Studied

New York

• • • **Although scrap metal** dealers are reported to have been discounting the 80¢ price for tin, an analysis of the long term tin market by factors in the industry indicates that if there is any movement from the 80¢ level during the next 6 to 8 months it must be upward. Bolivian factors, it is reported in the trade, are already canvassing the possibility of a price increase when their contract with the United States ends on Dec. 31. The price of $1.03 is mentioned as an appropriate figure to equalize tin with the increases made in other nonferrous metals.

It is the policy of the government, as revealed in recently released Dept. of Commerce statistics, to distribute government stocks of tin to exhaustion by the end of the year. By that time, production in the Far East is expected to grow sufficiently to provide for current requirements at that time. Far Eastern production of significant proportions this year was written off at the Tin Study Group conference at Brussels in April. However, despite the failure of Far Eastern production to materialize as anticipated in some quarters last year, U. S. government allocations during the year are not believed to be causing serious hardship to domestic tin consumers.

The Netherlands East Indies is the area from which large scale tin production can be expected at the earliest date. Six dredges have been shipped to this area from the United States and Holland. They left early in April and to date none has yet been reported to have reached its destination. It will require from 2 to 3 months after their arrival before they are ready for production.

Furthermore, the political situation in the East Indies has worsened recently with definite implications of further production delays. This unsettled political situation has not applied to the islands of Banka and Billiton although the independent Indies government has made definite efforts to bring the islands into its political sphere. A recent report indicates that one Billiton plant is on strike.

In the Malays, shortages of coal and equipment are likely to curtail production for a much longer time. Some producers have switched to oil fuel and will obtain supplies from Sumatra and Java. In these areas provision has been made for additional storage capacity, although at best adequate oil supplies are uncertain.

The Belgian Congo output is declining because of the gradual exhaustion of reserves. In Brazil, the tonnage of low grade ores normally reserved to the United States for the operation of the Texas City smelter may be lessened somewhat by the contract requirement to provide 8000 tons of fine tin content in ore for Argentina.

Monthly Average Prices

• • • **The average prices of the major nonferrous metals in June, based on quotations appearing in** The Iron Age, **were as follows:**

	Cents Per Pound
Electrolytic copper, Conn. Valley	21.56
Lake copper, Conn. Valley	21.625
Straits tin, New York	80.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Lead, St. Louis	14.80
Lead, New York	15.00

•

Lead Scrap For Sale

Washington

• • • **Reconstruction Finance Corp.** has announced that its subsidiary, the U. S. Commercial Co., will sell approximately 550 short tons of lead scrap which it has received from Japan. The material will be sold in five lots of approximately 110 short tons each on a sealed bid basis, for delivery f.o.b. cars at seller's warehouse, Staten Island, N. Y.

Prospective bidders may inspect the material on July 14, 1947, upon making request of U. S. Commerical Co., Washington 25, D. C.

•

Tin Smelter Continued

Washington

• • • **President Truman** has signed into law a measure extending until June 30, 1949, RFC authority to operate the government-owned tin smelter at Texas City, Tex. The act also calls for a study of the advisability of "maintenance on a permanent basis of a domestic tin-smelting industry."

•

Zinc Smelter Closing

Pittsburgh

• • • **The Langeloth,** Pa., plant of American Zinc & Chemical Co. will be closed as soon as existing raw material stocks are exhausted, according to plans disclosed in an announcement by B. N. Zimmer, president, at a conference with representatives at Local 95, CIO-United Mine, Mill and Smelter Workers.

Decision to close the plant was reached, according to a report from the conference, because the plant uses an obsolete process in the production of zinc. Some 900 workers at the plant will be affected by the closing, it was stated.

Nonferrous Metals Prices

Cents per pound

	June 25	June 26	June 27	June 28	June 30	July 1
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	80.00	80.00	80.00	80.00	80.00	80.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	33.00
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	$27.50
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$85 to $95
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$85.00 to $87.00
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$53 to $56
Silver, New York, cents per oz.	62.75
Tin, Straits, New York	80.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Zirconium copper, 6 pct Zr, per lb contained Zr	$8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	18.00
No. 120	17.50
No. 123	17.00
80-10-10 ingot	
No. 305	22.00
No. 315	20.00
88-10-2 ingot	
No. 210	27.75
No. 215	26.25
No. 245	20.25
Yellow ingot	
No. 405	14.50
Manganese Bronze	
No. 421	16.50

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	15.75
0.60 copper, max.	15.50
Piston alloys (No. 122 type)	13.75
No. 12 alum. (No. 2 grade)	13.25
108 alloy	13.50
195 alloy	14.25
AXS-679	13.75
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-97½ pct	14.50
Grade 2—92 pct-95 pct	12.50
Grade 3—90 pct-92 pct	11.75
Grade 4—85 pct-90 pct	11.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	37⅝
Electrodeposited	32⅝
Rolled, oval, straight, delivered	32⅞
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	33⅜
Zinc, Cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
Cast	51
Rolled, depolarized	52
Silver, 999 fine	
Rolled, 1000 oz. lots, per troy oz.	67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	43.00
Copper sulphate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz. lots, per oz.	54.00
Sodium cyanide, 96 pct, domestic, 200 lb drums	15.00
Zinc cyanide, 100 lb drums	34.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 52S, 24.2¢ 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base. B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb. f.o.b. mill. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75.

Round Rod: M, diam, in., ¼ to ⅜, 47¢; ½ to ¾, 45¢; 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢ 38 to 40, 75.5¢ 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.21; 5/16 to ⅜, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢ 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets		41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.50
Ribbon, ton lots	14.50
Plates	
Small	13.50
Large, over 12 in.	14.50

Copper, Brass, Bronze

(Cents per pound, f.o.b. mill effective June 11)

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	....	31.03	....
Low brass	34.04*	31.07	31.38
Yellow brass	32.39*	29.32	29.68
Red brass	34.65*	31.68	31.99
Naval brass	29.56	28.31	34.25
Leaded brass	27.98	24.39	30.13
Commercial bronze	35.52*	32.80	33.11
Manganese bronze	33.14	31.64	37.75
Phosphor bronze, 5 pct.	53.25*	52.25	52.00
Muntz metal	29.17	27.92	32.36
Everdur, Herculoy, Olympic, etc.	37.07	35.57	38.44
Nickel silver, 5 pct.	41.20	40.28	38.67
Architectural bronze	27.94	....	....

*Seamless tubing.

Scrap Metals

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Cartridge brass turnings	14¼
Loose yellow brass trimmings	15⅛

Copper and Brass

No. 1 heavy copper and wire	14½—15
No. 2 heavy copper and wire	13½—14
Light copper	12½—13
Auto radiators (unsweated)	8½— 9
No. 1 composition	10½—11
No. 1 composition turnings	10 —10⅛
Clean red car boxes	9 — 9½
Cocks and faucets	9 — 9½
Mixed heavy yellow brass	7 — 7¼
Old rolled brass	7 — 7¼
Brass pipe	8½— 9
New soft brass clippings	10½—11
Brass rod ends	9½—10
No. 1 brass rod turnings	8½— 9

Aluminum

Alum. pistons free of struts	4 — 4½
Aluminum crankcases	5 — 5½
2S aluminum clippings	7 — 7⅓
Old sheet & utensils	5½— 6
Mixed borings and turnings	—2
Misc. cast aluminum	5 — 5½
Dural clips (24S)	5 — 5½

Zinc

New zinc clippings	6 — 6½
Old zinc	4¼— 4½
Zinc routings	1½— 2
Old die cast scrap	2½— 3

Nickel and Monel

Pure nickel clippings	15½—17½
Clean nickel turnings	14 —15
Nickel anodes	16 —17
Nickel rod ends	17 —18
New Monel clippings	10 —10½
Clean Monel turnings	7 — 8
Old sheet Monel	9½—10
Old Monel castings	7½— 8
Inconel clippings	8 — 8½
German silver clippings, mixed	7½— 8
German silver turnings, mixed	5½— 6

Lead

Soft scrap lead	10 —10½
Battery plates (dry)	5 — 5⅛

Magnesium Alloys

Segregated solids	8
Castings	5

Miscellaneous

Block tin	63 —65
No. 1 pewter	50 —52
No. 1 auto babbitt	38 —40
Mixed common babbitt	11½—12
Solder joints	12 —13
Siphon tops	38 —39
Small foundry type	13 —13½
Monotype	12 —12½
Lino and stereotype	11½—12
Electrotype	10 —10½
New type shell cuttings	10½—11
Clean hand picked type shells	4½— 5
Lino and stereo dross	5 — 5½
Electro dross	3 — 3¼

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.

Full lead sheets	18.25
Cut lead sheets	18.75
Lead pipe, manufacturing point	17.50
Lead traps and bends	List +42%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +42%
Lead wool	19.50

SCRAP

. . . News and Market Activities

Prices Mark Time Due to Coal Shutdown

New York

• • • **Scrap consumers,** brokers and dealers were playing a watchful waiting game this week. Some mills refused to attempt to go all out on production by replacing dwindling pig iron stocks with larger scrap charges. Many frankly felt it would be uneconomical—particularly because of tight scrap supply and the tendency of a large order to boom prices.

Two sharp advances were registered throughout the country during the week. They were in Chicago, where No. 1 steel was up an average of $2.50; and in Detroit, where brokers were paying an average of $3.25 more. Observers say these movements were only reflections of strength shown elsewhere several weeks previously. Pittsburgh, for instance had advanced $3 in the previous two weeks before the Chicago market caught the strength during the past week.

Except for Boston where it went up $1 a ton there were no other price advances on No. 1 steel. Some markets reported underlying strength on the theory that it will take good prices to produce shipments. Almost everywhere on the selling end there was a conviction that a quick coal mine settlement would mean higher prices for steelmaking scrap.

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PITTSBURGH—The coal strike had an agitating rather than a depressing effect on the scrap market here, but activity in the market is confined to speculation on prices rather than actual buying. The market shows plenty of strength, even though mills are not actively buying any large tonnages. One large consumer released shipments of scrap that have been held up for about 2 months, but is not yet buying scrap. Other consumers are watchfully waiting to see how much the market will move up. A short coal strike should do nothing but strengthen the market, so that mine operation after the miners vacation period should bring the market up again. The usual rumors of $38 to $40 purchases are rampant, but cannot be traced to definite orders.

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CHICAGO — An exceptionally strong market prevails in this area. Indications are that regardless of what happens in coal, scrap prices are destined to continue upward. Competitive bidding for scrap tonnages, which appear to be insufficient to fill present orders, has already made $33 and $34 commitments "No-good orders," according to many dealers and brokers. Railroad lists have been scarce during the past week but prices on specialties remain strong, with heavy railroad melting sales to brokers bringing prices well over the current consumer price. Turnings and borings are in most cases bringing more than the usual spread between this scrap and openhearth would dictate. Widespread vacations in metalworking shops will seriously cut the available scrap to be generated from the smaller plants during July and August.

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PHILADELPHIA — Activity in this district marked time this week pending the outcome of the coal labor situation. There is a somewhat improved flow of shipments, and mills are getting better deliveries. Heavy melting grades remain firm at recent quotations. Machine shop turnings and shoveling turnings are being quoted at $28 to $29.

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NEW YORK—Steel scrap prices were unchanged for the week here as brokers reported a tapering off in orders by some consumers with a normal demand from others. Volume of shipments, which had been good for the past few weeks has fallen off rather badly. Cast prices are also unchanged; foundries are beginning their holidays and demand is off somewhat.

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DETROIT — The scrap market is very strong here again this week despite the fact that no new large orders have been placed by Detroit mill buyers. Earmarked scrap went this week for $32.32 for openhearth grades. The price of short shoveling turnings hit $26 compared with $22 at the start of the month. Similar advances have been made by other grades. Buying of cast grades is reported to be slow but there are definite indications that considerable price strength underlies the present quotations.

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CLEVELAND — A flood of rumors has engulfed the market here and in the Valley: Stories of higher prices being paid in other districts and accusations that other consumers are reaching out again for reportedly representative tonnages are keeping the trade buzzing. As matters stand now demand is still strong and supply weak and brokers are still shipping one for one and trying to cover in a market that belongs to the dealers. Shipments to most consumers are only fair and settlement of the coal crisis will mean that new buying will be at higher prices.

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BOSTON—Generally, Nos. 1 and 2 steel are $31 to $32, up $1 for the week. Talk is $32.50 would be paid for strictly heavy No. 1 if obtainable, but there is none. Brokers short the market quote $30 to $31. Turnings and borings have advanced about $3 a ton. Business has dropped abruptly. Only big buyers are a Buffalo and a Worcester mill, but the latter will not take automobile scrap. Better than $47 has been done on cast, but $40 to $45 is the going market. Most foundries, on vacation, have stopped buying.

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BUFFALO — The market for openhearth scrap was deadlocked at the start of the week with dealers turning down new business at $32 and mills refusing to go above that price for local scrap. No change was expected till the miners returned to the pits. Meanwhile consumers were paying $35 delivered Buffalo for scrap originating at Syracuse and other points east of Rochester to keep the material from going outside the district. Plant and scrap yard vacations were in full swing, further curtailing the flow. A boatload of 5000 tons from Duluth was scheduled to arrive over the holiday and 6000 tons was received by barge from New York.

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CINCINNATI — Prices are unchanged this week, with consumers reportedly buying no more than they absolutely need. Some said that in the event a coal strike developed they would cut back operations and hope to stockpile scrap. Some sellers say the market showed a tendency to mark time early this week—with the blame laid on the coal strike threat.

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BIRMINGHAM—Despite the coal mine holiday, demand for scrap remains strong in this market. Cast grade consumers are asking for immediate deliveries as insurance against expected banking of blast furnaces. Prices are unchanged.

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ST. LOUIS—The demand for steel casting and gray iron grades took the spotlight from the prime melting grades here this week. The items are scarce and prices are from $1 to $4 a ton higher. Floods have curtailed sharply the movement of all scrap to this district and fabricating yards here and in other points in Missouri and Iowa are under water regarding work. Wabash and Rock Island have lists of several thousand tons each with but little of the latter likely to come here.

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TORONTO—Business in the Canadian scrap markets developed a state of stagnation during the week, partly due to the long holiday weekend. Dealers state that receipts of scrap continue to taper off and offerings of both steel and iron grades are decidedly on the conservative side. Most dealers are satisfied to pick up supplies from local sources and no effort is being made to seek out country scrap. It is hoped that importations will enable mills to maintain steelmaking schedules without any serious cutbacks during the winter.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.50 to $36.00
RR. hvy. melting	38.50 to 39.00
No. 2 hvy. melting	35.50 to 36.00
RR. scrap rails	40.00 to 41.00
Rails 2 ft. and under	44.25 to 45.00
No. 1 comp'd bundles	35.50 to 36.00
Hand bdld. new shts.	35.50 to 36.00
Hvy. axle turn.	35.00 to 35.50
Hvy. steel forge turn.	35.00 to 35.50
Mach. shop turn.	30.00 to 30.50
Shoveling turn.	31.50 to 32.00
Mixed bor. and turn.	30.00 to 30.50
Cast iron borings	31.00 to 31.50
No. 1 cupola cast	36.00 to 37.00
Heavy breakable cast	32.50 to 33.00
Malleable	50.00 to 51.00
RR. knuck and coup	43.50 to 44.50
RR. coil springs	43.50 to 44.50
RR. leaf springs	43.50 to 44.50
Rolled steel wheels	43.50 to 44.50
Low phos.	40.00to 41.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$33.50 to $34.00
No. 2 hvy. melting	32.50 to 33.00
No. 1 bundles	33.50 to 34.00
No. 2 dealers' bundles	32.50 to 33.00
Bundled mach. shop turn.	32.50 to 33.00
Galv. bundles	30.50 to 31.00
Mach. shop turn.	29.00 to 30.00
Short shov. turn.	31.00 to 32.00
Cast iron borings	30.00 to 31.00
Mix. borings & turn.	28.50 to 29.00
Low phos. hvy. forge	38.50 to 39.00
Low phos. plates	36.00 to 36.50
No. 1 RR. hvy. melt.	35.00 to 36.00
Rerolling rails	42.00 to 42.50
Miscellaneous rails	39.00 to 40.00
Angles & splice bars	40.00 to 40.50
Locomotive tires, cut	39.50 to 40.00
Cut bolster & side frames	36.50 to 37.00
Standard stl. car axles	42.50 to 43.00
No. 3 steel wheels	37.50 to 38.00
Couplers & knuckles	39.00 to 40.00
Malleable	56.00 to 56.50
No. 1 mach. cast.	43.00 to 45.00
Rails 2 ft. and under	43.00 to 44.00
No. 1 agricul. cast.	39.00 to 39.50
Hvy. breakable cast.	34.00 to 34.50
RR. grate bars	34.50 to 35.00
Cast iron brake shoes	38.00 to 38.50
Cast iron carwheels	38.00 to 40.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 bundles	31.00 to 32.00
No. 2 bundles	31.00 to 32.00
Mach. shop turn.	26.00 to 27.00
Shoveling turn.	28.00 to 29.00
Cast iron borings	27.00 to 28.00
Mixed bor. & turn.	26.00 to 27.00
Low phos. plate	41.00 to 42.00
No. 1 cupola cast	46.00 to 47.00
Hvy. breakable cast.	37.00 to 38.00
Scrap rails	40.00 to 41.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy. melting	$31.00to $32.00
No. 2 hvy. melting	31.00 to 32.00
Nos. 1 and 2 bundles	31.00 to 32.00
Busheling	31.00 to 32.00
Shoveling turn.	26.00 to 27.00
Machine shop turn.	24.00 to 25.00
Mixed bor. & turn.	23.00 to 24.00
Cl'n cast. chem. bor.	25.00 to 26.00
No. 1 machinery cast	40.00 to 45.00
No. 2 machinery cast.	40.00 to 45.00
Heavy breakable cast.	40.00 to 45.00
Stove plate	40.00 to 45.00

DETROIT

Per gross ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$33.00 to $33.50
No. 2 hvy. melting	33.00 to 33.50
No. 1 bundles	33.00 to 33.50
New busheling	33.00 to 33.50
Flashings	33.00 to 33.50
Mach. shop turn.	23.50 to 24.00
Shoveling turn.	25.50 to 26.00
Cast iron borings	25.50 to 26.00
Mixed bor. & turn.	24.50 to 25.00
Low phos. plate	34.25 to 35.25
No. 1 cupola cast.	37.00 to 39.00
Hvy. breakable cast.	28.00 to 30.00
Stove plate	31.00 to 33.00
Automotive cast.	37.00 to 39.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.00 to $37.50
No. 2 hvy. melting	36.00 to 36.50
No. 1 bundles	37.00 to 37.50
No. 2 bundles	36.00 to 37.00
Mach. shop turn.	28.00 to 29.00
Shoveling turn.	28.00 to 29.00
Mixed bor. & turn.	26.00 to 27.00
Clean cast chemical bor.	31.00 to 33.00
No. 1 cupola cast.	46.00 to 47.00
Hvy. breakable cast.	44.00 to 45.00
Cast. charging box	44.00 to 45.00
Clean auto cast.	46.00 to 47.00
Hvy. axle forge turn.	36.00 to 36.50
Low phos. plate	40.50 to 41.00
Low phos. punchings	40.50 to 41.00
Low phos. bundles	39.50 to 40.00
RR. steel wheels	41.00 to 42.00
RR. coil springs	41.00 to 42.00
RR. malleable	52.00 to 53.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy, melting	$32.00 to $33.00
No. 2 hvy. melting	30.00 to 31.00
Bundled sheets	30.00 to 31.00
Mach. shop turn.	23.00 to 23.50
Locomotive tires, uncut	35.00 to 36.00
Mis. std. sec. rails	36.00 to 37.00
Rerolling rails	39.00 to 40.00
Steel angle bars	36.00 to 37.00
Rails 3 ft. and under	38.00 to 39.00
RR. steel springs	38.00 to 39.00
Steel car axles	38.00 to 39.00
Stove plate	36.00 to 37.00
Grate bars	36.00 to 37.00
Brake shoes	35.00 to 36.00
Malleable	54.00 to 55.00
Cast iron car wheels	40.00 to 41.00
No. 1 machinery cast.	40.00 to 41.00
Hvy. breakable cast.	35.00 to 36.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$30.50 to $31.00
No. 2 hvy. melting	30.50 to 31.00
No. 2 bundles	30.50 to 31.00
No. 1 busheling	30.50 to 31.00
Long turnings	22.00
Shoveling turnings	24.00
Cast iron borings	23.00
Bar crops and plate	31.00 to 32.00
Structural and plate	31.00 to 32.00
No. 1 cast	38.00 to 39.00
Stove plate	34.00 to 35.00
No. 1 RR. hvy. melt.	31.50 to 32.00
Steel axles	31.50 to 32.00
Scrap rails	31.50 to 32.00
Rerolling rails	35.00 to 36.00
Angles & splice bars	33.00 to 34.00
Rails 3 ft. & under	33.00 to 34.00
Cast iron carwheels	32.00 to 34.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$34.50 to $35.00
No. 2 hvy. melting	34.50 to 35.00
Mach. shop turn.	28.50 to 29.00
Short shov. turn.	29.50 to 30.00
Cast iron borings	29.50 to 30.00
Low phos.	38.50 to 39.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	31.00 to 32.00
No. 2 bundles	31.00 to 32.00
Comp. galv. bundles	31.00 to 32.00
Mach. shop turn.	23.00 to 24.00
Mixed bor. & turn.	23.00 to 24.00
Shoveling turn.	24.50 to 25.00
No. 1 cupola cast	39.00 to 40.00
Hvy. breakable cast.	37.00 to 38.00
Charging box cast.	37.50 to 38.50
Stove plate	37.50 to 38.50
Clean auto cast.	39.00 to 40.00
Unstrip. motor blks.	35.00 to 36.00
Cl'n chem. cast bor.	25.00 to 25.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 bundles	31.00 to 32.00
No. 2 bundles	31.00 to 32.00
No. 1 busheling	31.00 to 32.00
Mach. shop turn.	22.00 to 23.00
Shoveling turn.	24.00 to 25.00
Cast iron borings	22.00 to 23.00
Mixed bor. & turn.	22.00 to 23.00
No. 1 cupola cast	35.00 to 38.00
Charging box cast	29.00 to 30.00
Stove plate	30.00 to 35.00
Clean auto cast	35.00 to 38.00
Malleable	37.00 to 39.00
Low phos. plate	34.00 to 36.00
Scrap rails	33.00 to 36.00
Rails 3 ft & under	38.00 to 40.00
RR. steel wheels	38.00 to 40.00
Cast iron carwheels	38.00 to 40.00
RR. coil & leaf spgs.	38.00 to 40.00
RR. knuckles & coup	38.00 to 40.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$33.50 to $34.00
No. 2 hvy. melting	33.50 to 34.00
Compressed sheet stl.	33.50 to 34.00
Drop forge flashings	33.50 to 34.00
No. 2 bundles	33.50 to 34.00
Mach. shop turn.	28.50 to 29.00
Shoveling turn.	29.50 to 30.00
No. 1 busheling	33.50 to 34.00
Steel axle turn.	33.50 to 34.00
Cast iron borings	29.50 to 30.00
Mixed bor. & turn.	27.00 to 27.50
Low phos.	36.50 to 37.00
No. 1 machinery cast.	40.00 to 42.00
Malleable	55.00 to 57.00
RR. cast.	43.00 to 45.00
Railroad grate bars	38.00 to 39.00
Stove plate	39.00 to 40.00
RR. hvy. melting	36.00 to 38.00
Rails 3 ft. & under	44.00 to 45.00
Rails 18 in. & under	45.00 to 46.00

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	13.00
Elec. furn. 1 ft. und.	25.00
No. 1 cupola cast.	$32.00 to 33.00
RR. hvy. melting	20.50

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
No. 1 bales	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	14.50
No. 1 cupola cast.	$35.00 to 36.00
RR. hvy. melting	20.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$20.00
Elec. furn. 1 ft. und.	$23.50 to 25.00
No. 1 cupola cast.	27.50 to 29.00
RR. hvy. melting	21.00

HAMILTON, ONT.

Per gross ton delivered to consumer:

Cast grades f.o.b. shipping point

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

* Ceiling price.

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	July 1, 1947	June 24, 1947	June 3, 1947	July 2, 1946
Hot-rolled sheets	2.50	2.50	2.50	2.425
Cold-rolled sheets	3.20	3.20	3.20	3.275
Galvanized sheets (10 ga.)	3.55	3.55	3.55	4.05*
Hot-rolled strip	2.50	2.50	2.50	2.35
Cold-rolled strip	3.20	3.20	3.20	3.05
Plates	2.65	2.65	2.65	2.50
Plates, wrought iron	5.95	5.95	5.95	4.112
Stain's c-r strip (No. 302) *24 ga	30.30	30.30	30.30	30.30
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.60	2.60	2.60	2.50
Cold-finished bars	3.20	3.20	3.20	3.10
Alloy bars	3.05	3.05	3.05	2.92
Structural shapes	2.50	2.50	2.50	2.35
Stainless bars (No. 302).	26.00	26.00	26.00	25.97
Wrought iron bars	6.15	6.15	6.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.30	3.30	3.30	3.05
Wire nails	3.75	3.75	3.75	3.75
Rails: (dollars per 100 lb)				
Heavy rails	$2.50	$2.50	$2.50	$43.39*
Light rails	2.85	2.85	2.85	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$42.00	$42.00	$42.00	$39.00
Sheet bars	50.00	50.00	50.00	38.00
Slabs, rerolling	42.00	42.00	42.00	39.00
Forging billets	50.00	50.00	50.00	47.00
Alloy blooms, billets, slabs	61.00	61.00	61.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.55	2.55	2.55	2.30
Skelp	2.35	2.35	2.35	2.05

Pig Iron: (per gross ton)	July 1, 1947	June 24, 1947	June 3, 1947	July 2, 1946
No. 2, foundry, Phila.	$36.51	$36.51	$36.51	$28.34
No. 2, Valley furnace	33.50	33.50	33.50	26.50
No. 2, Southern, Cin'ti	34.75	34.75	34.75	26.94
No. 2, Birmingham	29.88	29.88	29.88	22.88
No. 2, foundry, Chicago†	33.00	33.00	33.00	26.50
Basic, del'd eastern Pa.	36.92	36.92	36.92	27.84
Basic, Valley furnace	33.00	33.00	33.00	26.00
Malleable, Chicago†	33.50	33.50	33.50	26.50
Malleable, Valley	33.50	33.50	33.50	26.50
Charcoal, Chicago	45.99	45.99	45.99	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$35.75	$35.75	$32.25	$20.00
Heavy melt'g steel, Phila.	37.25	37.25	31.50	18.75
Heavy melt'g steel, Ch'go	33.75	31.25	29.75	18.75
No. 1, hy. comp. sheet, Det.	33.25	30.00	27.00	17.32
Low phos., Youngs'n	38.75	38.75	35.75	22.50
No. 1, cast, Pittsburgh	36.50	36.50	36.50	20.00
No. 1, cast, Philadelphia	46.50	46.50	42.50	20.00
No. 1, cast, Chicago	44.00	43.00	39.75	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$10.50	$10.50	$10.50	$7.50
Foundry coke, prompt	11.25	11.25	11.25	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	21.50	21.50	22.00	14.375
Copper, Lake, Conn.	21.625	21.625	21.625	14.375
Tin, Straits, New York	80.00	80.00	80.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	8.25
Lead, St. Louis	14.80	14.80	14.80	8.10
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
July 1, 1947	2.85664¢ per lb.	$33.15 per gross ton	$35.58 per gross ton
One week ago	2.85664¢ per lb.	$33.15 per gross ton	$34.75 per gross ton
One month ago	2.85664¢ per lb.	$33.15 per gross ton	$31.17 per gross ton
One year ago	2.73011¢ per lb.	$26.12 per gross ton	$19.17 per gross ton

	HIGH	LOW
1947	2.85664¢	2.85664¢
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5
1943	2.29176¢	2.29176¢
1942	2.28249¢	2.28249¢
1941	2.43078¢	2.43078¢
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16
1939	2.35367¢ Jan. 3	2.26689¢ May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2
1933	1.95578¢ Oct. 3	1.75836¢ May 2
1932	1.89196¢ July 5	1.83901¢ Mar. 1
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 66 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

	HIGH	LOW
1947	$33.15 Mar. 11	$30.14 Jan. 7
1946	30.14 Dec. 10	25.37 Jan. 1
1945	25.37 Oct. 23	23.61 Jan. 2
1944	$23.61	$23.61
1943	23.61	23.61
1942	23.61	23.61
1941	$23.61 Mar. 20	$23.45 Jan. 2
1940	23.45 Dec. 23	22.61 Jan. 2
1939	22.61 Sept. 19	20.61 Sept. 12
1938	23.25 June 21	19.61 July 6
1937	23.25 Mar. 9	20.25 Feb. 16
1936	19.74 Nov. 24	18.73 Aug. 11
1935	18.84 Nov. 5	17.83 May 14
1934	17.90 May 1	16.90 Jan. 27
1933	16.90 Dec. 5	13.56 Jan. 3
1932	14.81 Jan. 5	13.56 Dec. 6
1931	15.90 Jan. 6	14.79 Dec. 15
1930	18.21 Jan. 7	15.90 Dec. 16
1929	18.71 May 14	18.21 Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	HIGH	LOW
1947	$39.67 Mar. 18	$29.50 May 20
1946	31.17 Dec. 24	19.17 Jan. 1
1945	19.17 Jan. 2	18.92 May 22
1944	19.17 Jan. 11	15.76 Oct. 24
1943	$19.17	$19.17
1942	19.17	19.17
1941	$22.00 Jan. 7	$19.17 Apr. 10
1940	21.83 Dec. 30	16.04 Apr. 9
1939	22.50 Oct. 3	14.08 May 16
1938	15.00 Nov. 22	11.00 June 7
1937	21.92 Mar. 30	12.67 June 9
1936	17.75 Dec. 21	12.67 June 8
1935	13.42 Dec. 10	10.33 Apr. 29
1934	13.00 Mar. 13	9.50 Sept. 25
1933	12.25 Aug. 8	6.75 Jan. 3
1932	8.50 Jan. 12	6.43 July 5
1931	11.33 Jan. 6	8.50 Dec. 29
1930	15.00 Feb. 18	11.25 Dec. 9
1929	17.58 Jan. 29	14.08 Dec. 8

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

a thousand and one...

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MACWHYTE PREFORMED AND NON-PREFORMED INTERNALLY LUBRICATED WIRE ROPES ... MONARCH WHYTE STRAND Wire Rope ... Special Traction Elevator Rope ... Stainless Steel Wire Rope ... Monel Metal Wire Rope ... Galvanized Wire Rope. Macwhyte also makes Atlas Braided Wire Rope Slings, Hi-Fatigue Aircraft Cables, Assemblies, Tie-Rods. Catalogs on request.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound of dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25c above base. (2) Commercial quality grade (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. (8) Also shafting. For quantities of 20,000 lb to 89,999 lb. (9) Carload lot in manufacturing trade. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only: Includes 3 pct freight tax. (14) Delivered Kaiser Co. prices: includes 3 pct freight tax. (15) 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Some sales are at higher prices. (17) Delivered Los Angeles; add ½¢ per 100 lb for San Francisco. (18) Delivered Los Angeles only.

Basing Points	Pitts-burgh	Chicago	Gary	Cleve-land	Birm-ingham	Buffalo	Youngs-town	Spar-rows Point	Granite City	Middle-town, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Phila-delphia
INGOTS															
Carbon, rerolling	($35.00 f. o. b. mill)														
Carbon, forging	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00								
Alloy	$52.00						(Canton = $52.00)								
BILLETS, BLOOMS, SLABS							(Provo = $53.20)								
Carbon, rerolling	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00					$45.00		
Carbon, forging billets	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	(Provo = $61.20, Duluth = $52.00[13]) $50.00						$53.00		
Alloy	$61.00	$61.00				$61.00	(Bethlehem, Massillon, Canton = $61.00)						$64.00		
SHEET BARS							$53.00		Portsmouth, Ohio = $67.20						
PIPE SKELP	2.35¢	2.35¢					2.35¢	2.35¢	(Coatesville = 2.35¢)						
WIRE RODS	2.55¢	2.55¢		2.55¢	2.55¢		(Worcester = 2.65¢)					3.27¢[13]			
SHEETS															
Hot-rolled	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.875¢	2.50¢		3.24¢[17]	2.65¢	2.79¢	2.70¢
Cold-rolled[1]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	3.20¢		3.30¢				3.35¢	3.61¢	3.58¢
Galvanized (10 gage)	3.55¢	3.55¢	3.55¢		3.55¢		3.55¢	3.55¢	3.65¢			4.32¢[17]		3.84¢	3.75¢
Enameling (12 gage)	3.55¢	3.55¢	3.55¢	3.55¢			3.55¢		3.65¢				3.70¢	3.95¢	3.93¢
Long ternes [2] (10 gage)	3.55¢	3.55¢	3.55¢											3.95¢	3.91¢
STRIP															
Hot-rolled[3]	2.50¢	2.50¢	2.50¢	2.50¢[15]	2.50¢		2.50¢						2.65¢	2.93¢	2.88¢
Cold-rolled[4]	3.20¢	3.30¢		3.20¢			3.20¢			(Worcester = 3.40¢)			3.35¢	3.61¢	3.58¢
Cooperage stock	2.80¢	2.80¢			2.80¢		2.80¢							3.09¢	
TINPLATE															
Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85		(Warren, Ohio = $5.75)			$6.157	$6.082[11]
Electro, box 0.25 lb.	Deduct 90¢ from standard coke base box price.														
Electro, box 0.50 lb.	Deduct 70¢ from standard coke base box price.														
Electro, box 0.75 lb.	Deduct 50¢ from standard coke base box price.														
BLACKPLATE, 29 gage[5]	3.60¢	3.60¢	3.60¢		3.70¢			3.70¢	3.70¢		(Warren, Ohio = $5.75)			3.99¢	3.90¢
BLACKPLATE, CANMAKING															
55 lb. to 70 lb.	Deduct $1.55 from standard coke base box.														
75 lb. to 95 lb.	Deduct $1.65 from standard coke base box.														
100 lb. to 118 lb.	Deduct $1.55 from standard coke base box.														
TERNES, MFG., Special coated	Deduct 85¢ from standard coke base box price.														
BARS															
Carbon steel	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢					3.285¢	2.75¢	3.01¢	2.98¢
Rail steel[6, 16]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢									
Reinforcing (billet)[7]	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢				2.985¢		2.74¢	2.65¢
Reinforcing (rail)[7, 16]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢								
Cold-finished[8]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢							3.35¢	3.61¢	3.58¢
Alloy, hot-rolled	3.05¢	3.05¢				3.05¢	3.05¢	(Bethlehem, Massillon, Canton = 3.05¢)					3.20¢		3.19¢
Alloy, cold-drawn	3.80¢	3.80¢	3.80¢	3.80¢		3.80¢							3.95¢		
PLATE								(Coatesville = 2.80¢, Claymont = 2.90¢, Geneva, Utah = 2.80¢)							
Carbon steel[12]	2.65¢	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢	2.65¢				3.48¢[14]		2.87¢	2.85¢
Floor plates	3.90¢	3.90¢												4.30¢	4.28¢
Alloy	3.79¢	3.79¢			(Coatesville = 4.10¢)									4.01¢	3.895¢
SHAPES, Structural	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢	(Geneva, Utah = 2.65¢)		(Bethlehem = 2.50¢)			3.17¢[18]		2.70¢	2.64¢
SPRING STEEL, C-R															
0.26 to 0.40 carbon	3.20¢			3.20¢			(Worcester = 3.40¢)								
0.41 to 0.60 carbon	4.70¢			4.70¢			(Worcester = 4.90¢)								
0.61 to 0.80 carbon	5.30¢			5.30¢			(Worcester = 5.50¢)								
0.81 to 1.00 carbon	6.80¢			6.80¢			(Worcester = 7.00¢)								
Over 1.00 carbon	9.10¢			9.10¢			(Worcester = 9.30¢)								
MANUFACTURERS' WIRE[9]															
Bright[10]	3.30¢	3.30¢		3.30¢	3.30¢		(Worcester = 3.40¢, Duluth = 3.35¢)					4.31¢[13]		3.71¢	3.68¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.25¢	4.25¢		4.25¢	(Worcester = 4.35¢, Duluth = 4.50¢)				(Trenton = 4.50¢)			5.28¢[13]		4.66¢	4.595¢
PILING, Steel sheet	3.00¢	3.00¢				3.00¢								3.41¢	3.38¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton (4 to 6 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo	Base per lb
18	4	1	—	74¢
1.5	4	1.5	8	59¢
6	4	2	6	63¢

High-carbon-chromium*	47¢
Oil hardening manganese*	26¢
Special carbon*	24¢
Extra carbon*	20¢
Regular carbon*	16¢

Warehouse prices on and east of Mississippi are 2¢ per lb. higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.20¢
Armature	4.50¢
Electrical	5.00¢
Motor	5.75¢
Dynamo	6.45¢
Transformer 72	6.95¢
Transformer 65	7.65¢
Transformer 58	8.35¢
Transformer 52	9.15¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.50
Angle splice bars, 100 lb	3.00
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$2.85
Light rails (from rail steel), f.o.b. Williamsport, Pa.	2.95

	Base per lb
Cut spikes	4.50¢
Screw spikes	6.40¢
Tie plate, steel	2.80¢
Tie plates, Pacific Coast	2.95¢
Track bolts	6.50¢
Track bolts, heat treated, to rail roads	6.75¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio; Weirton, W. Va.; St. Louis, Kansas City, Minnequa, Colo.; Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa.; Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C	$6.75	$13.50

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad		
10 pct, f.o.b. Coatesville	30.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	Delivered San Francisco
Standard, galvanized and coated nails	$3.75†	$4.83
Cut nails, carloads, Pittsburgh base	5.30	....

†10¢ additional at Cleveland, 30¢ at Worcester.

	Base per 100 lb	
Annealed fence wire	$3.95‡	$4.96
Annealed galv. fence wire	4.40‡	5.41

‡10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base	column
Woven wire fence*	84	107
Fence posts, carloads	90††	...
Single loop bale ties	86	110
Galvanized barbed wire**	94	114
Twisted barbless wire	90	...

* 15½ gage and heavier. ** On 80-rod spools in carload quantities. ††Pittsburgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	HI Steel	Mayari R	Otiscoloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10
Sheets									
Hot-rolled	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85
Cold-rolled	4.75	4.75	4.75	....	4.75	4.75	4.75	4.75	4.75
Galvanized	....	5.40	....	....	....	5.40	....	....	....
Strip									
Hot-rolled	3.85	3.85	3.85	....	3.85	3.85	3.85	3.85	3.85
Cold-rolled	....	....	4.75	....	....	4.75	4.75	4.75	4.75†
Shapes	....	3.85	....	....	3.85	3.85	3.85	3.85	....
Beams	....	3.85	....	....	....	3.85	....	....	....
Bars									
Hot-rolled	4.00	4.00	4.00	....	....	4.00	4.00	4.00	4.00
Cold-rolled	....	....	....	....	....	....	....	4.60	....
Bar shapes	....	4.00	....	....	4.00	4.00	4.00	4.00	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts. F.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only

Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
⅛-in.	55½	41
¼-in.	58½	45
1 to 3-in.	60½	47½
Wrought Iron, buttweld		
⅛ in.	2	+20
¼-in.	11½	+10
1 and 1¼-in	17	+ 2
1½-in.	22½	1½
2-in.	23	2
Steel, lapweld		
2-in.	53	39½
2½ and 3-in.	56	42½
3½ to 6-in.	58	44½
Steel, seamless		
2-in.	52	38½
2½ and 3-in.	55	41½
3½ to 6-in.	57	43½
Wrought Iron, lapweld		
2-in.	14½	+ 5½
2½ to 3½-in.	17	+ 1½
4-in.	21	4
4½ to 8-in.	19	2½

Extra Strong, plain ends

Steel, buttweld		
⅛-in.	54½	41½
¼-in.	58½	45½
1 to 3-in.	60	48
Wrought Iron, buttweld		
⅛-in.	6½	+14
¼-in.	12½	+ 8
1 to 2-in.	22	2
Steel, lapweld		
2-in.	52	39½
2½ and 3-in.	56	43½
3½ to 6-in.	59½	47
Steel, seamless		
2-in.	51	38½
2½ and 3-in.	55	42½
3½ to 6-in.	58½	46
Wrought Iron, lapweld		
2-in.	17½	+ 2
2½ to 4-in.	26	8½
4½ to 6-in.	22	4

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to24 ft, inclusive.

OD in.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$15.29	$18.17	$15.00	$17.95
2½	12	20.57	24.43	20.11	24.07
3	12	22.87	27.18	22.26	26.68
3½	11	28.86	34.30	28.06	33.64
4	10	35.82	42.55	34.78	41.68

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in. del'd Chicago	$81.56
6-in. to 24-in. del'd New York	79.80
6-in. to 24-in., Birmingham	71.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	95.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	48
9/16 & ⅝ in. x 6 in. & shorter	50
All larger diam and longer lengths	47
Lag, all diam over 6 in. long	48
Lag, all diam x 6 in. & shorter	50
Plow bolts	57

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	48
9/16 to 1 in. inclusive	47
1⅛ to 1½ in. inclusive	45
1⅝ in. and larger	40

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	USS	SAE
Base discount less case lots		
7/16 in. and smaller	..	51
½ in. and smaller	50	..
½ in. through 1 in.	..	48
9/16 in. through 1 in.	49	..
1⅛ in. through 1½ in.	47	46
1⅝ in. and larger	40	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts	*Consumer*
Packages, nuts separate	65 and 10
In bulk	75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets *(½ in. and larger)*	*Base per 100 lb*
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.25
F.o.b. Lebanon, Pa.	5.40

Small Rivets *(7/16 in. and smaller)*	*Percent Off List*
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws *(In packages)*	*Percent Off List Consumer*
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	56
¾ to 1 in. x 6 in., SAE 1035, heat treated	47
Set screws, cup and oval points	61
Milled studs	33
Flat head cap screws, listed sizes	21
Fillister head cap, listed sizes	40

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports*)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, nonbessemer	5.80
Mesabi, bessemer	5.70
Mesabi, nonbessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	24¢ to 28½¢
Copper, electrolytic, 100 and 325 mesh	30¢ to 31½¢
Copper, reduced, 150 and 200 mesh	29¢ to 30½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots	10¢ to 15¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8.5¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	35¢ to 37¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	29¢ to 31¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	23¢ to 26¢
Antimony, 100 mesh	36.05¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.025
Lead, 100, 200, & 300 mesh	18.50¢ to 23.50¢
Manganese, minus 325 mesh and coarser	49¢
Nickel, 150 mesh	51½¢
Silicon, 100 mesh	26¢
Solder powder, 100 mesh	8½¢ plus metal
Stainless steel, 302, minus 100 mesh	75¢
Tin, 100 mesh	90¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.90
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.	$2.65
Under 100 lb	$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$10.00 to $11.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	11.00 to 12.00
Foundry, Byproduct	
Chicago, del'd	$16.10
Chicago, f.o.b.	15.10
New England, del'd	17.25
Seaboard, Kearney, N. J., f.o.b.	15.35
Philadelphia, del'd	15.46
Buffalo, del'd	16.14
Ashland, Ohio, f.o.b.	13.35
Painesville, Ohio, f.o.b.	14.60
Erie, del'd	15.75
Cleveland, del'd	15.90
Cincinnati, del'd	15.39
St. Louis, del'd	15.85
Birmingham, del'd	13.25

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads, Per 1000
First quality, Ohio	$64.00
First quality, Pa., Md., Ky., Mo.	70.00
First quality, New Jersey	75.00
Sec. quality, Pa., Md., Ky., Mo.	64.00
Sec. quality, New Jersey	59.00
Sec. quality, Ohio	56.00
Ground fire clay, net ton, bulk	10.00

Silica Brick

Pennsylvania and Birmingham	$70.00
Chicago District	79.00
Silica cement, net ton (Eastern)	12.00
East Chicago	13.00

Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$59.00

Magnesite Brick

Standard, Balt. and Chester	$81.00
Chemically bonded, Baltimore	70.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in bulk	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	24.00
in sacks	28.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. Billmeyer, Pa., Millersville, Ohio	10.55

Midwest, add 10¢; Mo. Valley, add 20¢

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP				BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled	Plates	Standard Structural Shapes	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.14	$5.18	$5.29	$4.43	$5.28	$4.44	$4.22	$4.48	$5.13	$8.37	$8.37	$9.88	$9.88
New York	4.22	5.17[1]	5.47	4.62	5.40	4.62	4.37	4.62	5.17	8.42	8.42	9.92	9.92
Boston	4.40	5.22	4.95[12]	4.65	6.36	4.70	4.47	4.62	5.22	8.62	8.62	9.97	9.97
Baltimore	3.89	....	5.14	4.40	....	4.39	4.34	4.45	5.10	....	....	....	....
Norfolk	4.15	....	....	....	....	4.50	4.50	4.75	5.50	....	....	....	....
Chicago	3.65	....	....	4.05	5.05	4.25	4.10	4.10	4.75	8.10	8.10	9.35	9.35
Milwaukee	4.099	4.899[1]	5.249	4.199	....	4.399	4.249	4.249	4.899	8.399	8.399	9.649	9.649
Cleveland	3.95	4.55	5.238	4.188	5.00	4.25†	4.311	4.10	4.75	8.358	8.358	9.35	9.35
Buffalo	4.15	4.85[1]	5.35	4.30	5.25	4.55	4.10	4.10	4.75	8.10	8.10	9.35	9.35
Detroit	4.05	4.85	5.42	4.34	5.24	4.49†	4.42	4.20	4.87	8.51	8.51	9.74	9.74
Cincinnati	3.916	4.716	5.166	....	....	4.553	4.444	4.403	5.053	....	....	....	....
St. Louis	3.999	4.799[1]	5.424	4.199	5.424	4.399	4.249	4.249	5.074	8.574	8.574	9.824	9.824
Pittsburgh	3.95	4.65[1]	5.10	4.05	4.95	4.25	4.10	4.10	4.75	8.10	8.10	9.35	9.35
St. Paul	4.284[7]	5.084[1]	5.434[2]	4.384[7]	....	4.584[7]	4.434[7]	4.434[7]	5.476[6]	....	7.084[6]	....	....
Omaha	4.668	6.118[1]	5.918	4.868	....	5.068	4.918	4.918	5.818	....	....	....	....
Indianapolis	3.84	4.84	5.29	4.24	5.01	4.51	4.36	4.56	5.01	....	....	....	....
Birmingham	4.15[11]	....	5.25	4.15[11]	....	4.35[11]	4.10[11]	4.10[11]	5.58	....	....	....	....
Memphis	4.27	....	5.97	4.72	....	4.92	4.67	4.67	5.78	....	....	....	....
New Orleans	*4.68[11]	5.94[1]	....	4.88[11]	....	5.03[11]	*4.73[11]	*4.83[11]	5.94[6]	....	....	....	....
Los Angeles	5.15	7.00[1]	6.70	5.65	8.35[5]	5.10	5.20	5.10	6.90[14]	10.15	9.35	11.05	11.05
San Francisco	4.70[8]	6.30[9]	6.45	5.20[8]	....	5.00[8]	4.90[8]	4.75[8]	7.00[10]	....	....	....	....
Seattle	4.80[4]	6.75[2]	6.30	5.30[4]	....	5.15[4]	4.95[4]	5.00[4]	7.10[14]	....	9.50[6]	....	10.85[6]
Portland	5.00[4]	....	6.25	5.50[4]	....	5.25[4]	5.10[4]	5.10[4]	7.20	....	9.30[6]	....	....
Salt Lake City	5.65	....	7.10	6.35	....	5.70	5.85	5.95	7.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 lb and over.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999; (8) 400 lb and over; (9) 450 to 1499; (10) 500 to 999; (11) 400 to 3999; (12) 450 to 3749; (13) 400 to 1999; (14) 1500 and over.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to ¾ in. thick and 90 in. wide.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	34.00	34.50	35.00	35.50	.....
Birdsboro	34.00	34.50	35.00	35.50	39.00
Birmingham	29.38	29.88	....	.....	.....
Buffalo	32.50	33.00	33.50	.....	.....
Chicago	32.50	33.00	33.50	34.00	.....
Cleveland	32.50	33.00	33.50	.....	.....
Duluth	33.00	33.50	34.00	34.50	.....
Erie	32.50	33.00	33.50	34.00	.....
Everett	....	45.00	45.50	.....	.....
Granite City	32.50	33.50	33.50	....	.....
Neville Island	33.00	33.50	33.50	34.00	.....
Provo	33.00	33.50	....	....	.....
Sharpsville	33.00	33.50	33.50	34.00	.....
Steelton	34.00	.....	.....	.....	39.00
Struthers, Ohio	33.50	....	....	....	.....
Swedeland	35.00	35.50	36.00	36.50	.....
Toledo	32.50	33.00	33.50	34.00	.....
Troy, N. Y.	34.00	34.50	35.00	35.50	39.00
Youngstown	33.00	33.50	33.50	34.00	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	45.50	46.00	.....	.....
Boston	Birdsboro-Steelton	4.82	....	....	....	....	43.82
Brooklyn	Bethlehem	3.00	37.00	37.50	38.00	38.50	.....
Brooklyn	Birdsboro	3.50	....	....	....	....	42.50
Cincinnati	Birmingham	4.87	34.25	34.75	.....	....	.....
Jersey City	Bethlehem	1.84	35.84	36.34	36.84	37.34	.....
Jersey City	Birdsboro	2.33	....	....	....	....	41.33
Los Angeles	Provo	5.94	38.94	39.44	....	....	.....
Mansfield	Cleveland-Toledo	2.33	34.83	35.33	35.83	36.33	.....
Philadelphia	Swedeland	1.01	36.01	36.51	37.01	37.51	.....
Philadelphia	Birdsboro	1.49	....	....	.....	.....	40.49
San Francisco	Provo	5.94	38.94	39.44	.....	.....	.....
Seattle	Provo	5.94	38.94	39.44	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	33.25	34.25	34.25	.....	.....

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$42.50; f.o.b. Buffalo—$43.75. Add $1.00 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorous $40.50 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, $45.99. High phosphorous charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	157.00
Delivered Pittsburgh	140.25

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	7.00	7.25	7.80
Ton lots	8.00	8.60	10.50
Less ton lots	8.40	9.00	10.90

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$43.00	$44.00
F.o.b. Pittsburgh	47.00	48.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.06% max. C, 0.06% P, 90% Mn	21.00	22.10	22.70
0.10% max. C	20.50	21.60	22.20
0.15% max. C	20.00	21.10	21.70
0.30% max. C	19.50	20.60	21.20
0.50% max. C	19.00	20.10	20.70
0.75% max. C, 7.00% max. Si	16.00	17.10	17.70

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.65
Ton lots	7.70
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	6.75
Ton lots	7.75
Less ton lots	8.15

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $64.00 f.o.b. Keokuk, Iowa; $65.00 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add 50¢ per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	16.50	17.85	19.60
97% Si, 1% Fe	16.00	18.25	20.00

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	4.25	4.50	4.70
Ton lots	5.25	5.85	6.15
Less ton lots	5.65	6.25	6.55

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	11.65	....	....
50% Si	7.80	8.30	8.50
75% Si	10.00	10.30	11.05
80-90% Si	11.30	11.60	12.35
90-95% Si	12.80	13.10	13.80

Ferrochrome (65-72%*Cr*, 2% *max. Si*)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.75	22.15	22.25
0.50% C	21.50	21.90	22.00
1.00% C	21.00	21.40	21.50
2.00% C	20.50	20.90	21.00
65-69% Cr, 4-9% C	15.60	16.00	16.15
62-66% Cr. 4-6% C. 6-9% Si.	16.60	17.00	17.15

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.85	10.10	10.20
Ton lots	10.75	11.65	12.25
Less ton lots	11.15	12.05	12.65

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chrominum contained, lump sie, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	16.70	17.10	17.25
Ton lots	17.90	19.20	20.00
Less ton lots	18.60	19.90	20.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	21.00	21.40	21.50
Ton lots	22.35	23.00	24.20
Less ton lots	23.35	24.00	25.20

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	14.00	14.50	16.55
Ton lots	16.10	16.85	19.00
Less ton lots	17.10	17.85	20.00

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	17.60	18.45	20.20
Less ton lots	18.60	19.45	21.20

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.60	$2.35	$2.95
Less ton lots	1.95	2.70	3.75

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	16.00	17.10	19.05
Less ton lots	16.75	17.85	19.80

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	14.25	15.35	17.30
Less ton lots	15.00	16.10	18.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa. York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.25
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b Langeloth, Washington, Pa., per pound contained Mo.	95¢
Calcium molybdate, 40-45%, f.o.b Langeloth, Washington, Pa., Per pound contained Mo.	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo.	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo.	80¢
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y. ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$142.50
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton	$65.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy. Carload lots	17.00¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy Carload, bulk	5.50¢
Alsifer, 20% Al, 40% Si, 40% Ft, contract basis, f.o.b. Niagara Falls, carload	6.25¢
Ton lots	6.75¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	9.00¢
Ton lots	9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed. Ferroboron, 17-50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese — Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.044

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.

Carload lots	35¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0% Al 1.0—2.0%.

Ton lots, per pound	8.0¢

Production Started At Republic Steel Corp.'s New 48-in. Strip Mill

Cleveland

• • • **Production from** Republic Steel Corp.'s new 48-in. strip mill in Youngstown is now under way, according to company officials.

The mill was made by adding three 4-high finishing stands to the present 84-in. plate mill, together with coiling and coil conveying equipment. Items to be rolled on the mill are skelp for Republic's three Youngstown electric weld tube mills and strip for further processing into tinplate at the Niles plant of Republic's Warren district.

Completion of the mill will provide greater integration of the Youngstown plant by bringing about a better balance between ingot production and finishing capacity. The product of the mill will not be sold directly to the trade and will not make available increased tonnages of sheet and strip from Republic as a whole.

According to company officials, however, it will bring about more efficient coordination between the Youngstown and Warren Republic steel plants in the production of tinplate. Republic in Youngstown with 5 blast furnaces, 15 open-hearths and 2 bessemer converters has a steel ingot capacity considerably in excess of finishing capacity, while in Warren the opposite is true.

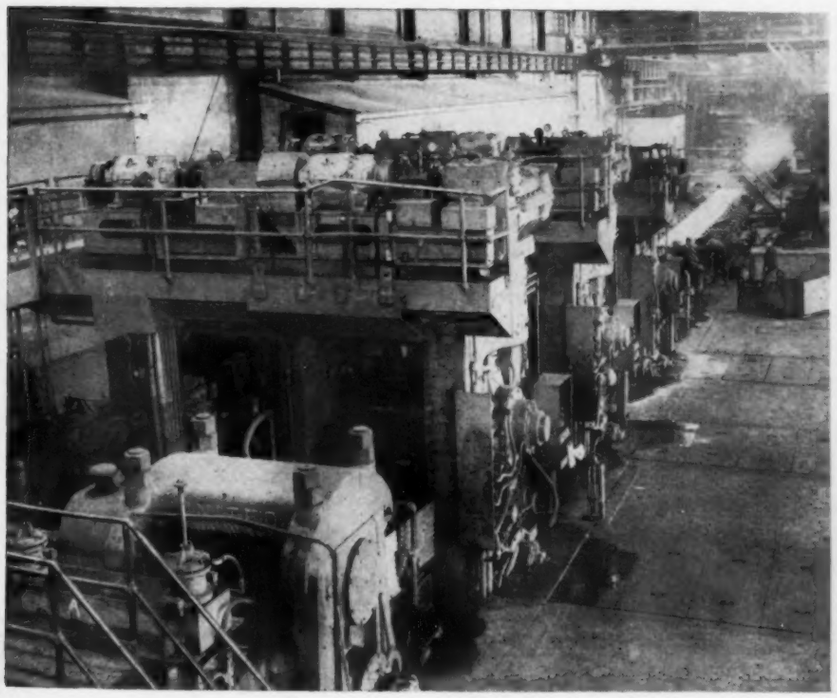
In the past, slabs from Youngstown have been shipped to Warren to be hot rolled to "hot bands" for tinplate, the hot-rolled coils trucked to Niles for cold reduction to tinplate gages and processing through the electrolytic and hot dip tin lines. Now hot bands will be rolled at Youngstown and shipped directly to Niles.

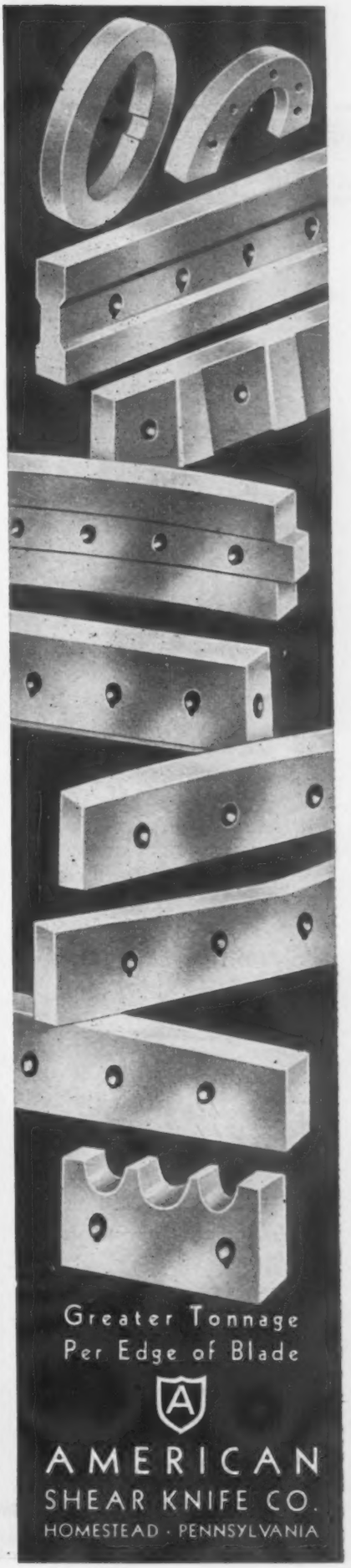
Capacity of the Warren 10-stand, 42-in. hot mill has been overtaxed by the tinplate coils, and use of the new Youngstown mill will relieve this overload.

At present, it is anticipated the new Youngstown mill will eventually produce 30,000 tons of skelp for Republic's pipe mills and 20,000 tons of tinplate bands per month. It is also possible that tonnages for other purposes beside tinplate and skelp may ultimately be rolled.

The new strip mill has been installed in the existing plate mill building, but the construction of three additional buildings to serve the mill was necessary. These buildings are a slab storage area,

PLUS THREE: *By adding three 4-high finishing stands, plus coiling and handling equipment, to the present 84-in. plate mill, Republic Steel has built itself a new 48-in. strip mill. It will turn out skelp for electric weld tubing and strip for tinplate.*





● Users tell us repeatedly that their polishing costs are lower when they change to LIONITE Abrasive Grains for set-up wheels. Actual production figures from a variety of polishing operations bear this out.

JOB NO. 1 **Polishing wheels of size 46 CBT Lionite polished 90 to 130 discs and corn planter runners per wheel. The grain previously used only lasted for 40 to 60 pieces per wheel.**

JOB NO. 2 **In polishing hammers, wheels of size 46 NB Lionite lasted an average of 2½ hours each where another make of grain lasted 1¼ hours.**

If you are interested in lower polishing costs (and who isn't?), ask to have a Lionite representative go over your polishing operation. His recommendations may result in very worthwhile savings.

GENERAL ABRASIVE COMPANY, INC.

Lionite and Carbonite Abrasive Grains

NIAGARA FALLS, NEW YORK, U. S. A.

200 x 60 ft; a coil storage area, 120 x 60 ft; and a brick motor room building, 160 x 54 ft. An additional reheating furnace was built to supplement the three formerly used at the plate mill. Four heavy duty cranes with capacities between 30 and 50 tons were also installed. Completion of the new strip mill was delayed a year beyond anticipated dates due to delayed delivery of various equipment items.

To Study White-Collar Exemptions Under Fair Labor Standards Act

Washington

• • • **An advisory committee** of 12 to study so-called "white-collar" exemptions under the Fair Labor Standards Act has been appointed by the Dept. of Labor. A public hearing on proposed changes in regulations will be held following the first committee meeting in early July.

Three committee members each were nominated by the National Assn. of Manufacturers, U. S. Chamber of Commerce, American Federation of Labor and the Congress for Industrial Organization. The members and their affiliations are:

(*NAM*) Albert S. Regula, vice-president, General Time Instruments Corp.; Merle Hale, director, salaried personnel activity, General Motors Corp.; Reuben S. Haslam, associate counsel, NAM.

(*USCC*) Thomas R. Reid, director of human relations, McCormick & Co., Inc.; James Tanham, vice-president, The Texas Co.; W. H. Winans, industrial relations manager, Union Carbide & Carbon Corp.

(*AFL*) Boris Shiskin, economist, AFL; Foster J. Pratt, president, International Federation of Technical Engineers, Architects' & Draftsmen's Unions, AFL, and Paul R. Hutchings, president, Office Employees International Union, AFL.

(*CIO*) Albert J. Fitzgerald, president, United Electrical Radio & Machine Workers of America, CIO; Lewis Merrill, United Office & Professional Workers of America, CIO; Tom Murray, international representative, United Steel Workers of America, CIO.

JESSOP and ALAN WOOD

complete working agreement

for expanding production of stainless-clad sheets

Jessop Steel Company and Alan Wood Steel Company announce the completion of a working agreement for large scale production of stainless-clad sheets by the patented Armstrong method.

Combined technical knowledge, experience and equipment of both companies will be utilized in expanding production.

Stainless-clad sheets will be available in greatly increased quantities for industrial equipment, commercial products, and home appliances.

New opportunities are open to manufacturers who recognize the advantages of stainless-clad sheets in modern design.

Consider the items you manufacture . . . may we assist your design engineer?

JESSOP STEEL COMPANY
Washington, Penna.

ALAN WOOD STEEL COMPANY
Conshohocken, Penna.

"Not only to serve today, but to anticipate tomorrow"
... Wm. B. Given, Jr.

MEEHANITE® CASTINGS
as made by BRAKE SHOE

. . . and the metal is geared to its job

These are two herringbone gear rotors. They are the only moving parts of the motor which powers the "Turbinair" Hoists of the Joy Mfg. Co., Sullivan Division, Claremont, N. H. This sturdy equipment is widely used in the mining industry throughout the world.

Each rotor is a casting. To gear with the exacting job demands of this service, the castings selected had to be machinable, wear-resistant, vibration-dampening and strong. And, after thorough consideration, Meehanite castings as made by Brake Shoe were chosen. In this case GA-Meehanite, a high-strength type, was the right metal for the job.

When your service requires this or other types such as heat-resisting, pressure-tight and other engineered castings, you also may benefit from Brake Shoe's casting techniques and foundry experience. Write us outlining your own need for castings. Let us discuss with you a metal that gears with them perfectly . . . tell you about castings backed by Brake Shoe's laboratory research and pilot plant work in its own experimental foundry.

AMERICAN Brake Shoe COMPANY

BRAKE SHOE AND CASTINGS DIVISION
230 PARK AVENUE, NEW YORK 17, N. Y.

British Plan Wrecks New Car Black Market In Year of Operation

London

• • • **The covenant plan,** designed by British motorcar manufacturers to eliminate the black market in new cars, has been in operation for nearly a year, and is considered to be a resounding success. Due to the 2-3-5 year waits predicted by British motorcar manufacturers, the black market has been acute in all types of automobiles. New cars, once delivered by the builder, were worth two to three times their original price.

The trade association of the dealers, with the cooperation of the manufacturers drew up a plan whereby the dealers refuse to deliver a new car unless the purchaser is willing to sign a covenant, throwing himself open to a double damage suit if he sells the car without permission within a specified period of time. When the plan was first set up the period specified was 6 months, but it has been recently changed to 1 year, since the delivery situation on new motorcars has become worse instead of better. The policy of the dealers is to grant permission for resale when requested in any specific case, if the seller agrees to sell at the list price.

There have been some conflicting views on the success of the plan, but all sources agree that the action has driven the amateur operators, who in most cases have been reselling their cars, out of the market. The plan certainly has not eliminated the black market, but most sources in the trade feel that it has eliminated about 90 pct of it. Evidence of this fact is the price level of legitimately used cars, which has been driven even higher by the absence of a steady turnover in slightly used new automobiles.

•

Detroit

The possibility that U. S. car dealers may adopt a type of sales contract that would prevent new car buyers from selling them for a quick turnover and a lush profit is growing but there may be legal difficulties in the way.

California, New York and Virginia are reported to have introduced such contracts. Detroit au-

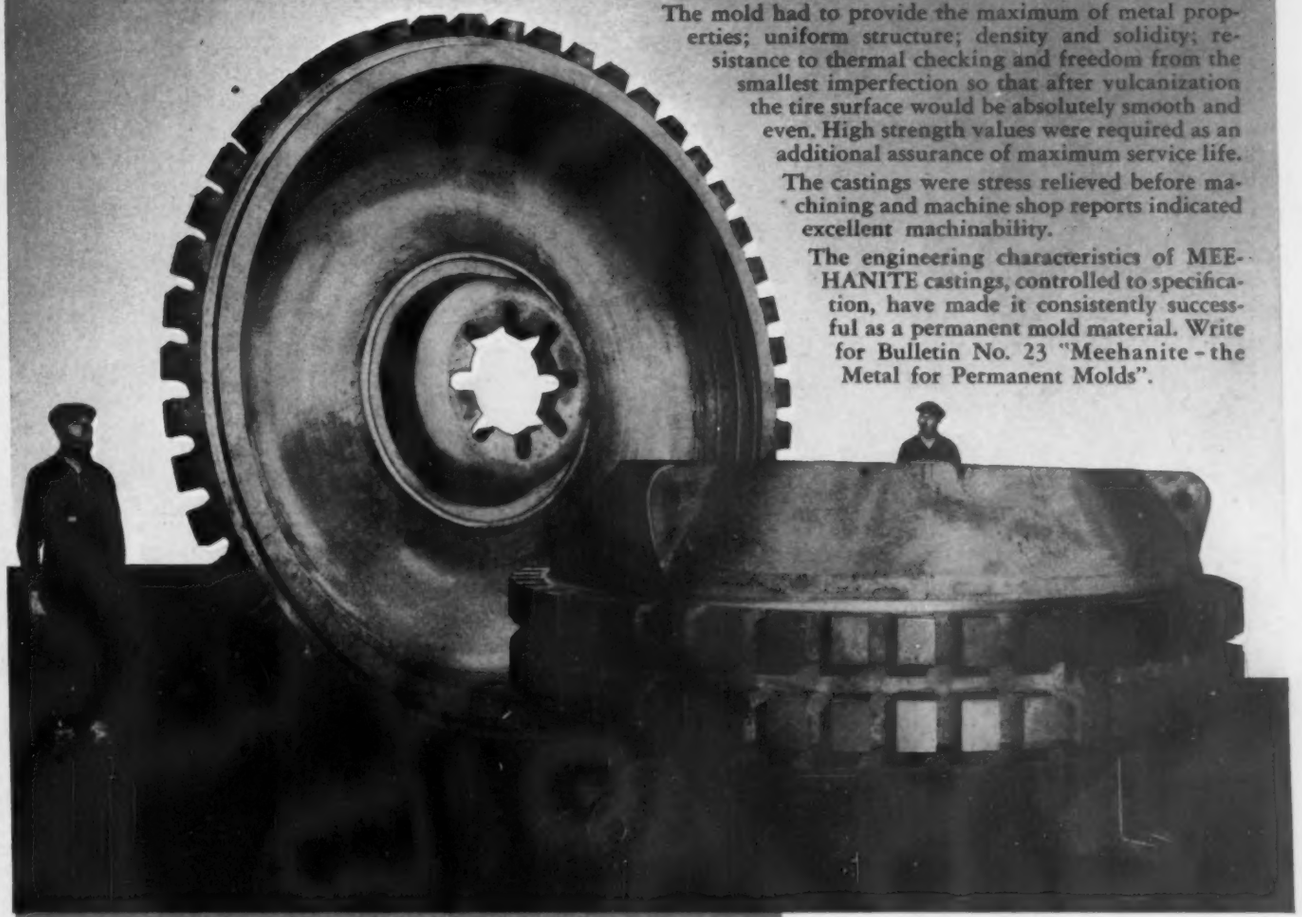
GIANT TIRE MOLD—A MEEHANITE® CASTING for HIGH QUALITY and EXTRA SERVICE LIFE

● The tire mold illustrated, said to be one of the largest ever produced, is a type GM MEEHANITE casting made by Farrel-Birmingham Company, Inc., Ansonia, Connecticut. Each half of the mold weighs 15 tons and is used in the production of 110" diameter tires.

The mold had to provide the maximum of metal properties; uniform structure; density and solidity; resistance to thermal checking and freedom from the smallest imperfection so that after vulcanization the tire surface would be absolutely smooth and even. High strength values were required as an additional assurance of maximum service life.

The castings were stress relieved before machining and machine shop reports indicated excellent machinability.

The engineering characteristics of MEEHANITE castings, controlled to specification, have made it consistently successful as a permanent mold material. Write for Bulletin No. 23 "Meehanite - the Metal for Permanent Molds".



MEEHANITE®

PERSHING SQUARE BUILDING

• NEW ROCHELLE • N. Y. •

Take Your Casting Problems to a MEEHANITE Foundry

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The American Laundry Machinery Co. . . . . *Rochester, New York*
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Banner Iron Works . . . . . *St. Louis, Missouri*
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Builders Iron Foundry, Inc. . . . . *Providence, R. I.*
H. W. Butterworth & Sons Co. . . . . *Bethayres, Pennsylvania*
Continental Gin Co. . . . . *Birmingham, Alabama*
The Cooper-Bessemer Corp., *Mt. Vernon, Ohio and Grove City, Pa.*
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Farrel-Birmingham Co., Inc. . . . . *Ansonia, Connecticut*
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Johnstone Foundries, Inc. . . . . *Grove City, Pennsylvania*
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The Stearns-Roger Manufacturing Co. . . . . *Denver, Colorado*
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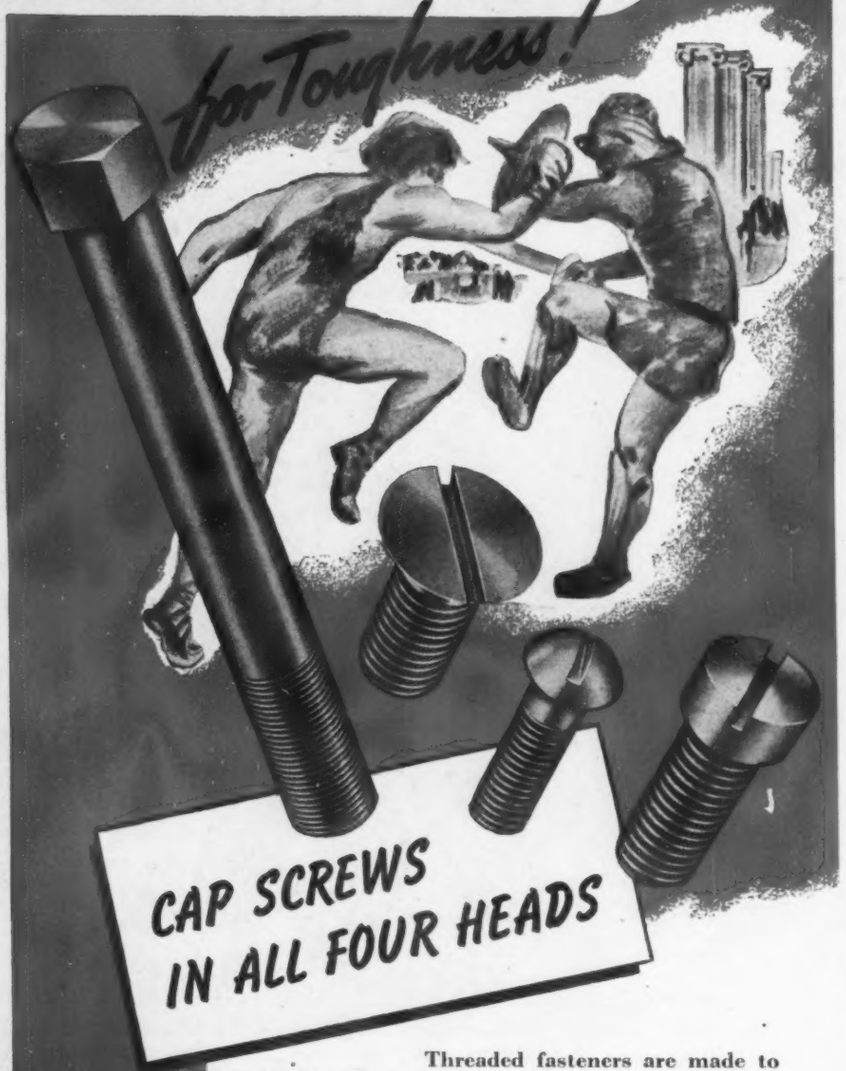
"This advertisement sponsored by foundries listed above."

TRIPLEX

for Toughness!



CAP SCREWS
IN ALL FOUR HEADS

Threaded fasteners are made to hold parts together. Either they hold firmly or they loosen. Sometimes they even break apart under extreme stress or strain.

That's why it's important to look for tough, strong holding power in buying any threaded fastener.

Cap screws available in Flat, Hex, Fillister and Button Heads up to 8" long and 1" in diameter. Take Triplex for Toughness. Write for new complete catalog of Triplex Fasteners.

THE TRIPLEX SCREW COMPANY
5309 GRANT AVENUE, CLEVELAND 5, OHIO

TRIPLEX THREADED FASTENERS
CAP AND SET SCREWS · BOLTS, NUTS AND RIVETS

tomobile dealers are considering a contract in which the dealer retains title to the car for 6 months after the sale. If the buyer is forced to sell the car within that time, he must sell it back to the original dealer for 10 pct less than the purchase price. Violation of the contract calls for the payment of damages up to 24 pct of the list price of the car.

The new contract has been drawn up by the board of directors of NADA with the approval of the Attorney General of the State of Michigan and Wilber M. Brucker, association attorney.

Automobile producers have been quick to point out, however, that complaints have already been received from "honest" buyers who resent these restrictions in their ability to own outright an article of commerce already paid for.

Another obstacle is that auto dealers operate in intra-state commerce while auto producers do an interstate business. The fact that U. S. operates under a constitutional government whereas England has no written constitution may make a difference in the application of such a law, according to the attorney for a large auto manufacturer.

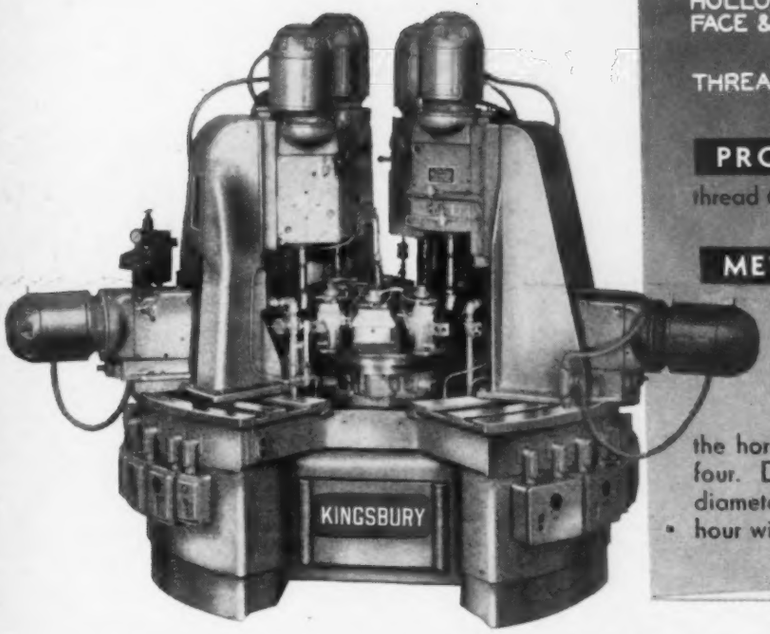
While automobile producers are known to be considering legal steps that may be taken to reduce bootlegging of new cars, it is not yet clear just what measures can be adopted to curb the practice of re-selling new cars at fancy prices. As it now appears, except where state laws exist, such contracts are likely to be a voluntary matter with car dealers. Some sources predict, however, that increased pressure by the public and the auto producers to keep cars out of the bootleg market will result in widespread adoption of such contracts by many U. S. auto dealers.

Electric Device Output Off

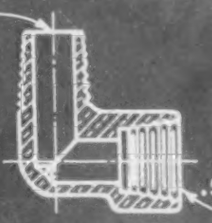
Washington

• • • **Shortages of** steel and component parts such as screws continue to restrict production of electric wiring devices, according to reports of manufacturers to the Office of the Housing Expediter. As a result, the upward production of four out of five critical wiring devices — convenience receptacles, toggle switches, lampholders and switch boxes—leveled off in the second quarter.

1947 MACHINE TOOL SHOW CHICAGO SEPT 17-26



BRASS ELBOW FORGINGS

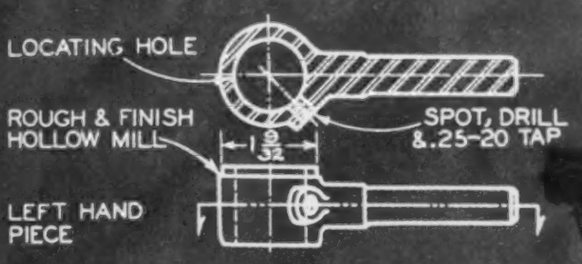


PROBLEM Drill, face, tap, hollow mill and thread 625 pieces per hour with one operator.

METHOD To meet this high production rate, the machine cuts the loading time with air-operated chucks. Drilling the holes in two steps keeps this operation well inside the required time cycle. Mounting vertical units on tunnel columns above the horizontal units reduces the working stations to four. Data: 20 in. index table, 5-stations. Base diameter 80 in. Gross Production: 785 pieces per hour with one operator.

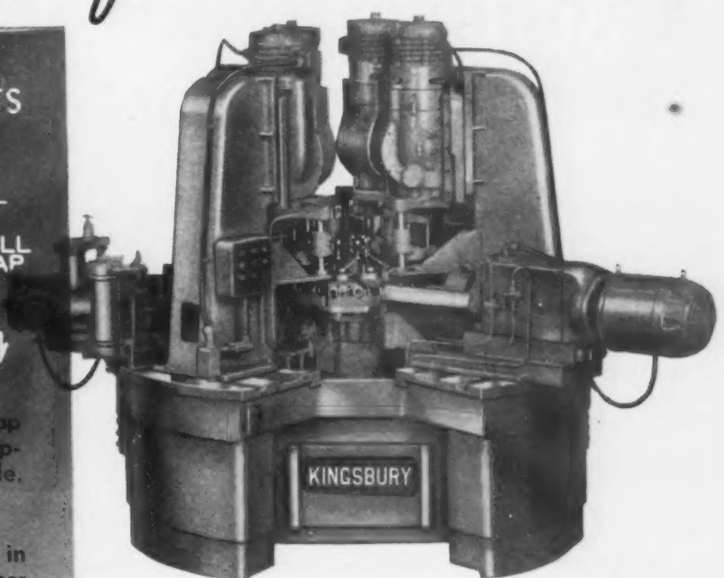
COMBINED OPERATIONS *for* HIGH PRODUCTION

FORGED STEEL TIE ROD SOCKETS



PROBLEM Hollow mill, spot, drill and tap 270 left or right hand pieces per hour with one operator. Hollow mill must be concentric with the hole.

METHOD By turning out lefts and rights in pairs, the machine has saved money for the customer in first cost and in change-over time. Double fixtures hold a right-hand and a left-hand part, with tapped holes parallel. Horizontal units with two spindle auxiliary heads spot, drill and tap each pair of parts. Separate hollow milling units operate vertically. Ball bearing guide bushings keep the hollow milling concentric with the guide hole. Data: 20 in. index table, 8-stations. Base diameter 80 in. Gross Production: 175 pieces of each hand per hour with one operator.



If you have similar problems, send us a print showing operations and hourly output. We will quote on a completely tooled machine, ready for use. It will have standard units up to 5 hp each and will do accurate work for years at intensive production. Kingsbury Machine Tool Corp., Keene, N. H.

KINGSBURY

Rotary Automatic —equipped with Siefen spray guns buffing aluminum pans.

FOR MIRROR FINISH . . . . . Siefen

Buffing Nu Spra Glu

BUFFING NU SPRA GLU, a grease and abrasive mixture, sprays to wheel, cuts compound consumption in half and buff wear one-third. Available in emulsion or oil-base types.

For satin finish—Nu Spra Glu. A liquid cold glue and abrasive mixture that dries instantly when sprayed on a revolving wheel.

★

AND REMEMBER— **NU GLU** is a *liquid cold glue* for setting up polishing wheels.

J. J. SIEFEN COMPANY

5629 LAUDERDALE • DETROIT 9, MICH.

Army Denies Existence Of "Vast Quantities" Of Steel Scrap Overseas

Washington

• • • **General belief** that there are vast amounts of scrap being held by the Army in overseas theaters has been refuted by the War Dept. which says that since December 1946, it has followed a policy of offering all available overseas scrap exclusively to purchasers who will contract to return it to the United States.

"There are no salable quantities available at this time in any of the overseas theaters," Brig. Gen. T. M. Osborne, of the General Staff, informed Sen. Homer Ferguson, R., Mich., in a letter dated June 3. He explained the term "salable" by stating that overseas scrap was offered for sale on a high bid basis only when minimum shipload quantities had been accumulated.

Furthermore, he added, shortage of facilities and personnel is holding up such shipments as have already been sold, citing as an example a sale of 165,000 tons in April which the buyer had as yet been unable to move out of Germany and Austria for loading on ships.

"It is estimated that under present conditions 6 months are required for completion of out shipments," General Osborne said.

"It should be borne in mind," he continued, "that the scrap sold by the Army in overseas theaters is that resulting from worn-out Army-owned materials and not captured enemy material and rubble from enemy cities. These latter materials offer an individual problem related with reparations.

It was also pointed out in the letter that most war surpluses overseas have been sold by the Foreign Liquidation Commissioner under bulk sales agreements with foreign governments. Thirty or more of these agreements have been made and most of the scrap or materials reducible to scrap covered in the agreements have been sold.

Prior to October 1946, overseas scrap was returned at Army expense; lack of funds led to a discontinuance of this policy. Acting on a War Dept. directive, however, since December 1946 overseas Army commanders have fol-

Choose the Right Steel Sheet For Your Product!

Careful selection of the *right* Continental sheet for each application, for each product improvement, will help you turn out products of higher quality, frequently at lower manufacturing cost. From the list of Continental sheets shown below you'll probably find the *right* one for your requirements.

KONIK SHEETS

Here is a new sheet, made exclusively by Continental, which provides added strength, toughness and greater resistance to rust. Made to a patented analysis, KONIK combines quality open hearth steel with copper, nickel and chromium to produce one of the finest, most enduring and most economical steels you can buy. KONIK works readily, stands extreme forming operations, and machines well. Write for special, descriptive folder.

GALVANNEALED

For sheet steel products requiring paint or enamels, specify Continental GALVANNEALED. This highly rust-resistant zinc-coated sheet has a matte-like surface which "takes" and "holds" fine finishes without the need of costly preparatory treatments. Its high degree of workability saves time, encourages good workmanship.

DULL-COAT

Like GALVANNEALED, Continental's DULL-COAT sheet also has a good surface which provides a tight bond for paints, enamels, and lacquers. It works easily, and is uniform in quality.

COPPER STEEL

To put longer life into your products . . . to provide extra resistance to rust and corrosion, use Continental COPPER STEEL. This sheet is made of special analysis copper steel. It is uniform in temper . . . noted for its workability and long life.

GALVANIZED

Here is a ductile and bright spangled time-saving sheet which is ideal for many products. It is uniform for good workability. Its zinc coating has an unusual ability to withstand forming operations without flaking or peeling.

ELECTRICAL

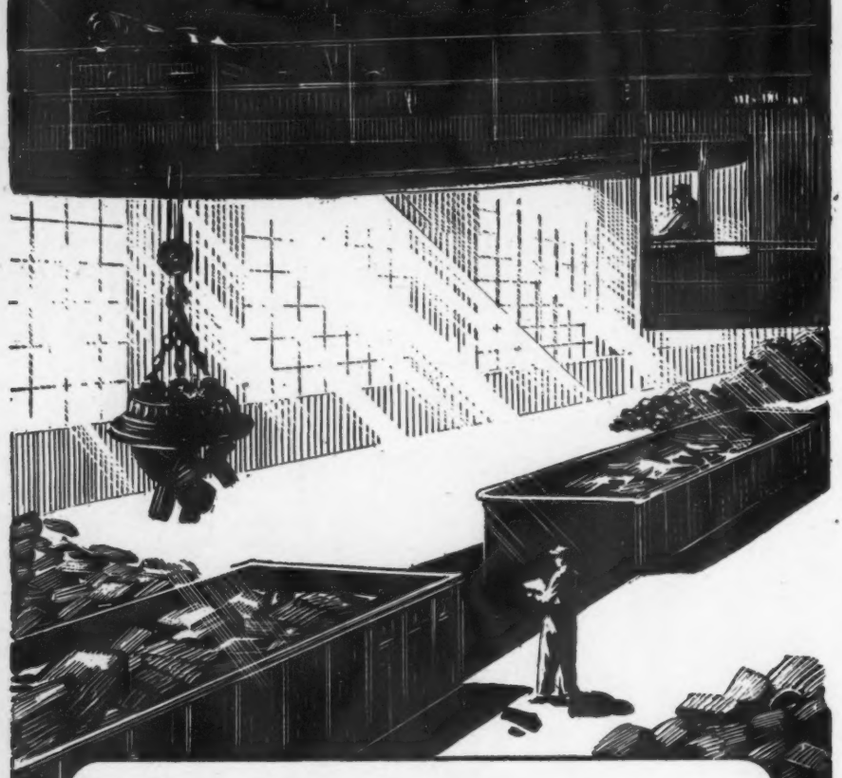
This sheet is made especially for electrical equipment manufacture. Its uniformity of temper makes it suitable for most requirements in this application.

CONTINENTAL STEEL CORPORATION

GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF STEEL SHEETS, including Continental GALVANIZED, COPPER-STEEL Galvanized, KONIK steel sheets Galvanized, UNIFORM SPANGLE Galvanized, DULL COAT, Continental GALVANNEALED, ELECTRICAL, Hot Rolled Pickled, and many styles of Formed Roofing. **ALSO,** Manufacturer's Wire in many sizes, shapes, tempers, and finishes, Continental Chain Link Fence, Nails, and other steel products.

Arms and Legs that never tire!

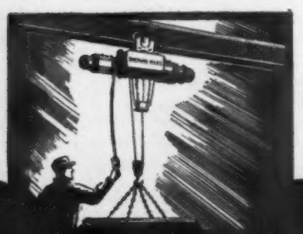


In heavy industry, loads to lift, move and deposit are reckoned in tons. No human muscles can endure such work day after day and year after year.

Shepard Niles electric cranes, made by America's oldest builder of electric cranes and hoists, are made in styles and sizes to take care of every heavy handling job—and to do it smoothly, easily, safely, economically and efficiently.

There's a type Shepard Niles crane to solve *your* handling problem. Trained, experienced Shepard Niles engineers, familiar with the requirements of thousands of crane users, will gladly study your needs and recommend, without obligation, the crane best suited to do your job.

A Shepard Niles crane of the right type will help you enjoy competitive advantages not possible without the best material handling equipment.



If your handling loads start with an eighth ton, why not look into the advantages of a Shepard Niles electric hoist? There are over 5,000 styles and sizes from which to select. There's one to fit your needs. Ask us to help you select it.

Shepard Niles
CRANE & HOIST CORPORATION

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lowed a policy of selling Army-generated ferrous and nonferrous scrap in shipload quantities.

"When scrap becomes so available for sale," General Osborne wrote, "those persons who have made known their interest are notified by means of invitations to bid which contain details as to quantities and location.

"Within the United States, the War Dept. is doing everything it can, within the funds and personnel available, to release the maximum amount of scrap to the civilian market. Particular emphasis is being placed on a procedure for sale of military type items (except ammunition) requiring mutilation or demilitarization, to purchasers who will agree to do the work under War Dept. supervision."

In the meantime, the government has assured the steel scrap and scrap consuming industries that there will be no change or relaxation in present regulations requiring Army scrap sold overseas to be returned to this country.

This assurance was contained in a letter from John R. Steelman, assistant to President Truman, to Robert W. Wolcott, chairman of the Foundry and Scrap Industries' Committee for Expediting Iron and Steel Scrap. Mr. Wolcott had inquired concerning a rumor that return would not be required after Oct. 1.

Such reports, Mr. Steelman said, are "without foundation."

Mr. Steelman also emphasized that under public law scrap may continue to be reimported into the United States duty-free until termination of the unlimited national emergency proclaimed in May 1941.

Awarded Building Contract

Washington

• • • **Steemberg Construction** Co., of St. Paul, with a low bid of $1,402,968 among nine bidders, has been awarded construction of a specially designed hangar at the very-heavy bomber base at Rapid City, S. D., the War Dept. announces. The hangar, believed to be the world's largest with a span of 340 ft and a floor space of 102,000 sq ft, will house two of the Army's largest bombers simultaneously. Its shell will be of reinforced concrete with sidewalls of conventional design.

(Advertisement)

Changing Flywheels to Welded Steel

BY L. C. BEATTY, PRES.
BEATTY MACHINE & MANUFACTURING CO., HAMMOND, IND.

In machining flywheel castings for our punches and shears, we occasionally ran into blow holes which necessitated scrapping of the flywheel and resulted in a loss of the machining man-hours. These unfortunate experiences led us to develop a line of welded flywheels built from homogeneous steel plate.

CUTS COST 20%

Not only have we eliminated former scrap losses, but we have cut the cost of our flywheels about 20% with the welded construction.

One of the cast iron flywheels is shown in Fig. 1. A welded flywheel is shown in Fig. 2.

Fig. 1. Flywheel of cast iron construction used formerly.

Fig. 2. A 50" welded steel flywheel after machining.

HOW IT IS BUILT

The 50" flywheel shown in Fig. 2 is built as shown in the sketch of Fig. 3. Interior fillet welds are made with the wheel in the flat position with one pass of ¼" Lincoln "Fleetweld 11" Electrode. The deep-groove welds that join the outer plates to the web are made downhand with the wheel in a motor-driven fixture as shown in Fig. 4. The grooves are filled with ¼" "Fleetweld 11".

We expect soon to install a "Lincolnweld" automatic outfit to make all of these welds. This equipment should reduce the cost of our flywheels even further.

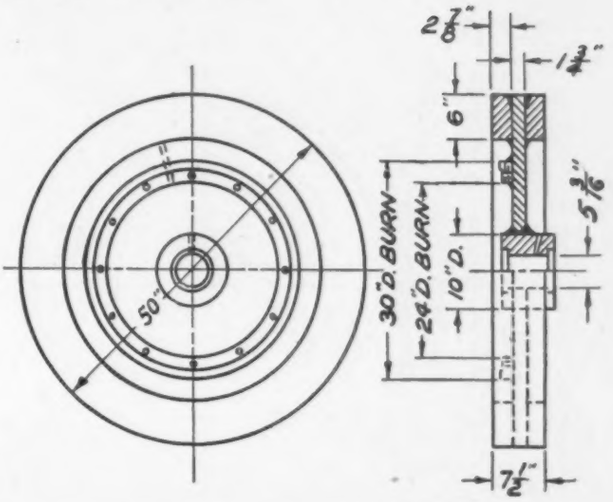

Fig. 3. Construction of welded steel flywheel.

Fig. 4. Welding flywheel in fixture.

Flywheels comprise just one of many parts for our shears and presses which we have changed over to welded steel design. In this development work we have found it helpful to have the Machine Design Studies published by Lincoln Electric. These may be obtained by writing The Lincoln Electric Company, Dept. 147, Cleveland 1, Ohio.

THE HOURS YOU SAVE in factory assembly by simply *peeling* precision laminations for accurate fitting of machine parts will be repeated by your users on every service adjustment. Want performance data and photo chart of applications?

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2215

Engineering Research Body Established For Great Britain

London

• • • **The British Government** through its Department of Scientific and Industrial Research, is setting up a special organization to carry out scientific research in mechanical engineering. Eventual annual expenditure will be in the region of $1,200,000, but this figure will not be reached for some years, owing to the difficulties at present in obtaining accommodation and qualified personnel. The research is intended to supplement that carried on in other research organizations in Great Britain, and will be confined to fundamental problems underlying all mechanical engineering.

Subjects in which research is expected to be carried out are:

(A) Properties and strength of materials.

(B) Mechanics of solids, stress, stability and vibration of structures.

(C) Mechanics of fluids; aerodynamics, gas dynamics and hydraulics in their mechanical engineering applications.

(D) Lubrication, wear and mechanical engineering aspects of corrosion.

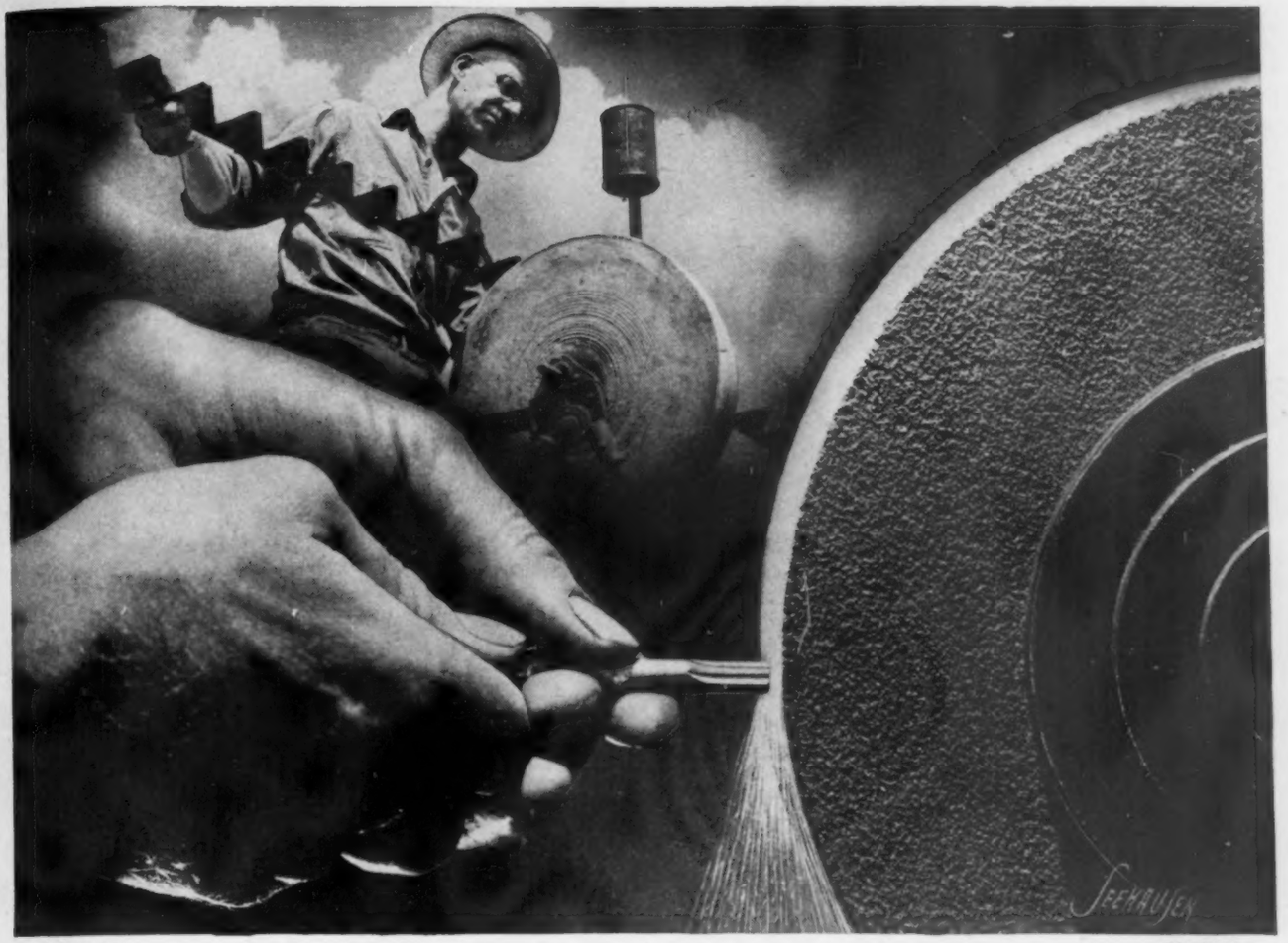
(E) Mechanisms, engineering metrology, and noise control.

(F) Mechanics of formation of materials; machine shaping of materials.

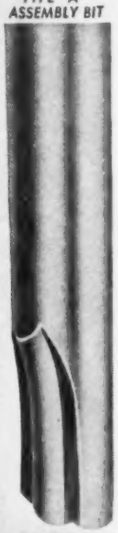
(G) Heat transfer, heat exchange apparatus and applied thermodynamics.

The location of the research station has not yet been decided. For the time being much of the work will be carried out at the National Physical Laboratory, while other work will be arranged for at universities and other institutions. The new station will work in close liaison with the N.P.L.

There is a very considerable amount of mechanical engineering research already in progress in this country, but there are gaps, such as research in hydraulic machinery, in heat transfer and heat exchange problems and apparatus,



TYPE "A" ASSEMBLY BIT



COMMON SCREWDRIVER

Yes! It's Just as Simple as That!

Reconditioning CLUTCH HEAD's Type "A" Bit Is Only a 60-Second Operation

MOREOVER, this simple operation can be repeated time, and time, and time again, to restore this rugged driving tool to its original efficiency. It involves only a 60-second application of the end surface to a grinding wheel.

This simple renewal cuts tool maintenance cost to a positive minimum

It definitely extracts the last vestige of service from each bit.

It does away with the expense and bother of "back-to-the-factory" shipments.

It multiplies again and again the number of screws driven per bit.

It smooths out assembly operation by eliminating delays . . . no waiting for returned bits.

Consider also, the longer uninterrupted service delivered by the rugged structure of the Type "A" Bit before reconditioning becomes necessary . . . its established record of 214,000 screws *driven in continuous operation* on the largest automobile assembly line in the world.

This is just one of the many exclusive CLUTCH HEAD *features contributing to lower costs through stepped-up production. Familarize yourself with all the advantages of this modern screw. Send for sample Type "A" Bit, package assortment of screws, and illustrated Brochure.*

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Whether a press is large or small, its operation creates vibration. And uncontrolled vibration wears out machinery prematurely, weakens building structure, causes accidents and breakdowns, spoiled work, and lowered employee efficiency.

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Write for bulletins giving further information. If you'll send us details of your machinery—type, make and size—we'll gladly submit recommendations without obligation.

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in applied thermodynamics, and in kinematics and mechanisms.

The visits of the Committee to the various research establishments made two predominant impressions on the minds of the members; firstly, the considerable extent to which such establishments had common basic needs, which could be met by research in a number of subjects contributing to the basis of mechanical engineering science; secondly, the small size of the groups or teams of workers concerned with specific items, so that, in the main, research tended to be confined to the urgent and immediate problems, to the neglect of the fundamental or generic research on which mechanical engineering practice of the future very largely depends. The Committee recommended that a new organization of the D.S.I.R. should be set up to make good this deficiency.

Dr. G. A. Hankins, superintendent of the engineering division of the National Physical Laboratory, D.S.I.R., has been appointed director of mechanical engineering research. He will be advised by a board, consisting of eminent scientists, technicians and industrialists, serving in their personal capacity and not as representatives of any organization to which they may belong.

Canadian Imports Gain

Toronto

• • • **Imports of iron** and steel into Canada for the first 3 months of this year showed a gain of almost 100,000 tons over the first quarter of 1946. For the quarter ended Mar. 31, imports totaled 222,811 net tons, of which all but 1833 tons came from the United States, and compares with total iron and steel imports in the same period last year of 126,853 net tons. Following are comparative production totals in net tons:

	First Quarter, 1947	First Quarter, 1946
Pig iron	1,099	2,551
Steel ingots	849	419
Bars and sections	34,735	14,192
Structural shapes	31,752	11,881
Plates and sheets	88,496	49,426
Strip	16,446	10,664
Skelp	18,115	13,611
Pipe and tubes	9,461	9,535
Wire, wire rope, etc.	8,353	3,664
Castings	9,215	4,650
Forgings, railway materials, rails, etc.	4,290	6,260
Total	222,811	126,853

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It's ARCOS for Dependable Weld Metal for service under High Temperatures, Pressures, Corrosion, Abrasion, Cavitation.

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and OXYARC PROCESS FOR CUTTING METALS

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When you order STRENES METAL dies from us, they are distinctively yours in metallurgical structure.

By varying cupola changes, we are able to give each batch of STRENES METAL special characteristics in respect to hardness, toughness, density, temperability, acid resistance, magnetic qualities, etc. Knowing the drawing and forming problem, we mix the ingredients of STRENES METAL to meet the requirements.

This explains why STRENES METAL dies deliver an extraordinary number of stampings between redressings, thereby greatly cutting maintenance and production costs.

It will pay you to find out how the advantages of STRENES METAL dies are applicable to your drawing and forming operations. Ask us for specific information.

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DRAWING AND FORMING DIES

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Euclid builds cranes in a wide capacity range in various spans and control systems to meet all industrial demands.

Wise judgment of Euclid users has been confirmed by years of reliable service.

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1361 CHARDON ROAD, EUCLID, OHIO

EUCLID CRANES AND HOISTS Raise Profits

Discusses Changes In Present Management Personnel Relations

New York

• • • **Despite two** World Wars, much social legislation and an immense growth in unionism, the basic objectives of sound personnel administration have not changed, Guy B. Arthur, Jr., vice-president of personnel division, American Management Assn., declared at a recent meeting of the association.

Management's personnel job is still to obtain capable people, utilize their efforts most effectively and to provide maximum satisfaction for each individual so as to maintain his willingness to work.

"Unfortunately top management has thought of the latter primary in terms of money and have underestimated the importance of the nonfinancial satisfactions in any job except possibly their own," Mr. Arthur said. "I refer to protection from insecurity; a chance to learn; the opportunity to advance to the limit of our abilities; the privilege of using our own ideas where they do not conflict with standard practice or policies; current knowledge of our progress; recognition of our accomplishments and contributions; social satisfaction from our associations; fair treatment; and information as to our company's activities, progress and contributions to society. These are the satisfactions which cannot be purchased out of the profits from enterprise. Notwithstanding, those companies which provide these nonfinancial incentives enjoy lower costs than their competitors.

"However constant," he said, "the objectives of sound personal administration we do find many changing aspects of the personnel function in management. These changes are caused by four factors: costs, unions, isms and research. As to costs it is only natural that top managements should scrutinize their personnel more closely as we reenter a competitive era.

"The growth of unionism," Mr. Arthur declared, is the second factor and one closely related to the first. Union restrictions on production will not help our costs in time to come. Above all work stop-

pages have made delivery promises absurd so that in the future contract buyers will attach as much importance to our ability to serve them on time as to our quality and prices. Woe be unto the concern who is continuously beset by work stoppages during a highly competitive era. No wonder the personnel function in management is receiving greater emphasis."

"The next cause of these changes," he went on to say, is one which I will term the ism factor. The rise of socialism on the European continent and the threat of communism throughout the world has made many top management people aware of their past failure to sell the American Way of Life or the Free Enterprise System to our working citizens. As a result we find a great emphasis today on programs for getting across the advantages of democracy to employees. Basically we have more than a selling job to do in this connection. We must prove that our system is superior to all others by making it work. That entails providing employment to 60 million people next year and every year. If we suffer with armies of unemployed in the future we can expect demands for government control and in the long run some form of ism.

The last factor contributing to the changing aspects of the personnel function in management is research. We are terribly weak insofar as carrying on adequate research in the field of human relations but what little has been done proves the need for better organizational plans and structures, improved techniques for selecting, training and supervising employees and a knowledge of why people react as they do. We are learning that financial incentives are not too effective where the morale of the work force is low. We are learning how to utilize our supervisory forces as a part of management. We are learning the relationship between sound personnel administration and labor costs. All in all we are learning and changes are taking place as a result but there is still much we do not know.

In conclusion, Mr. Arthur said, I have not mentioned labor relations because the principles of sound personnel administration do not vary from an organized to a non-organized situation. Good la-

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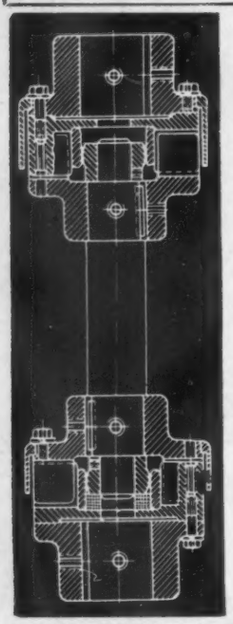

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bor relations do not result from legislation or collective bargaining, but rather from sound personnel administration as outlined above. Likewise the future of the free enterprise system depends not upon legislation or collective bargaining but upon the unselfish contributions of all members of the labor-management team towards their common objectives."

Need Larger Export Quotas According To Borg-Warner Official

Chicago

• • • **According to Olaf Haug** newly appointed automotive sales representative in continental Europe for the Borg-Warner International Corp., "American industry has been too slow in allocating a fair share of its production to overseas markets." The foreign representative stated that hundreds of factories are now springing up in Europe to testify to American manufacturers' near fatal delay in taking advantage of the export market.

The Borg-Warner representative said that we have actually forced Europe to compete with us in many fields where there would have been no competition if we had played our foreign trade cards right. Holland, which traditionally has given preference to American cars, still is the brightest spot in our automotive export picture, Mr. Haug said. Portugal and Switzerland, it is reported, also are good markets for American automotive manufacturers. Numerous orders for American automotive equipment are also being slipped underneath the Iron Curtain by Soviet dominated Bulgaria and Yugoslavia. Belgium was described as only a fair trade prospect.

Mr. Haug predicted that Norway should be well off economically and a good customer for American goods within two or three years. "It is mainly a matter of her regaining the maritime and railroad facilities of which she was deprived by her German conquerors in wartime.

"Sweden has gone back economically," Mr. Haug said. "Her imports are very severely curtailed by the commercial agreement Soviet Russia imposed on her in the closing months of the war."

WAA Offers Steel Foundry for Sale To Small Business

Washington

• • • **A Pacific-Northwest** electric steel foundry, now being operated by the Pacific Car & Foundry Co., under an interim leasing agreement which expires on Aug. 9, has been offered for sale or lease by WAA. The surplus property agency says that the foundry near Renton, Wash., is completely equipped mechanically and ready for immediate production. It was also stated that there are local sources of iron and steel scrap, and adequate labor, housing, and power facilities available. Erected in 1942, at a reported cost of $2,900,000, the installation occupies a site of approximately five acres. Rated capacity is approximately 1200 tons of castings per month.

Included in the disposal offer are all machines and production apparatus now located on the site, including two electric melting furnaces with a combined capacity of 6½ tons per hour, a No. 3 Wadsworth core-making machine, a three-rack core oven, a 60 in. Speedmuller, eleven overhead cranes of 5-20 tons capacity, seven heat-treat furnaces, completely equipped cleaning and molding departments, laboratory and testing devices, and office furniture and fixtures. The plant is serviced by sidings of the Pacific Coast and Northern Pacific Railroads, and deep-water and highway transportation facilities are available.

Bids for this foundry must be submitted on the approved WAA bid forms and must be received by the Seattle regional office of WAA not later than 11 a. m. (P.S.T.) July 1, 1947, when they will be publicly opened and read. Credit terms may be arranged for the purchase of this property, and special consideration will be granted to bids received from qualified small business concerns.

The WAA Seattle office will furnish specific data concerning this foundry and will arrange for inspection. General information concerning this foundry may be obtained from War Assets Administration, Office of Real Property Disposal, Washington 25, D. C.

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"Just about every industry (it seems) knows about my large range of weaves, crimps, metals, mesh and wire sizes . . . and about my maker's extensive facilities for working me into baskets, machine and window guards, partitions, enclosures, strainers and reel covers."

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NEXT MINUTE I'M FORMED

. . . into strainers or some specially ordered designs. My foundry work keeps me in RIDDLES all the time.

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. . . into machine or window guards, partitions, baskets and strainers . . .

OR I'M SOLDERED

together with other wire cloth into big panels (reel covers).

OTHER TIMES I'M BOUND

. . . along the edges with webbing for screening and bolting machinery . . . or equipped with hook strips for vibrating screens. I'm BOUND to please.

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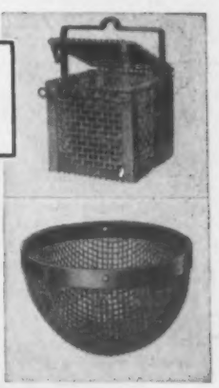

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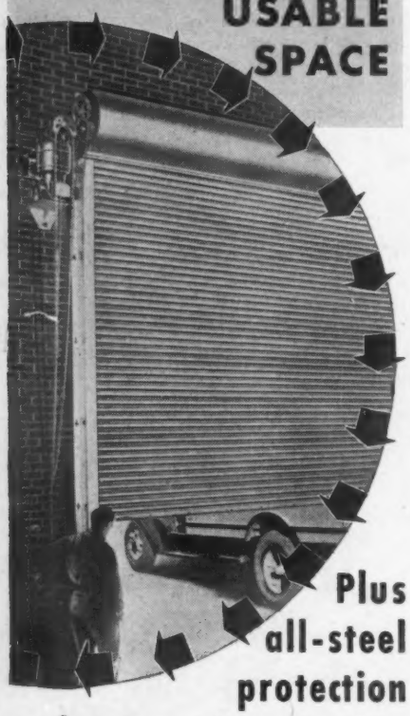
for **MORE All-Around USABLE SPACE**



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● **Add extra savings with KINNEAR MOTOR OPERATORS**

For maximum convenience and economy, use Kinnear Motor Operators, with push-button controls at door jamb. (Extra controls may also be used at any number of remote points.) Promotes prompt door closure that reduces heating and air-conditioning costs. Write today for your free copy of 40-page Kinnear catalog.

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Saving Ways in Doorways
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Industrial Research Institute Elects New Officers at Meeting

New York

• • • **At the ninth** annual meeting of Industrial Research Institute held recently in Swampscott, Mass., N. A. Shepard, chemical director of American Cyanamid Co., was elected president and E. W. Engstrom, vice-president in charge of research of the RCA Laboratories, vice-president for the ensuing year. C. L. Bausch, vice-president of Bausch & Lomb Optical Co., and P. D. V. Manning, vice-president in charge of research of International Minerals & Chemical Corp., were elected to 3-year terms on the board of directors.

The second presentation of the Industrial Research Institute Medal was made to Charles Allen Thomas, executive vice-president, Monsanto Chemical Co., for his pioneering and leadership in the development of the American industrial research system and for his participation in American chemical enterprise.

Karl T. Compton, president, Massachusetts Institute of Technology, Cambridge, Mass., addressed the institute on the subject of tilling the soil for the industrial research crop. He gave examples to show that a long period of fundamental research preparation must precede most important developments.

Italian Machine Tool Industry Represented At International Fair

Paris

• • • **Italian machine-tools** were again prominent at this year's Paris Trade Fair, just ended. A similar display was a feature of the 1946 Fair, and created no little surprise to visitors, for little more than 12 months earlier the Allied armies had been fighting their way up through Italian territory. The importance to Italian economy of the machine tool industry is stressed in a survey published by the Assn. of Italian Joint Stock Companies in Rome.

This claims that in the second half of 1946 there was a considerable increase in the export of machine tools, which outdistanced

short cuts for sale

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that of all the other products of the engineering and electrical engineering trades. A further advance is predicted for this year. It is argued that Italy can be both an importer and exporter of machine tools, as her imports do not adversely affect the home specialist factories, while her exports do not curtail the supplies required by national industries.

According to the survey, there are now in Italy some fifty engineering shops making machine tools with up-to-date equipment. Most of these factories are in Piedmont, Lombardy and Emilia, but there are also firms in Venetia, Tuscany, Latium and Campania, which have repaired the damage suffered during the war and are now once more starting operations. The view is advanced that Italian industry can partially fill the gap caused by Germany's disappearance from the machine tool market.

The survey laments the shortages and irregularity in the supply of coal, pig iron, steel ingots and nonferrous metals and the difficulties which prevent the factories working full time. From 9 to 15 months is required before a machine tool can be delivered. The survey suggests that an influx of new capital is required to allow of organizing the industry on broader foundations and bring cost into line with the prices ruling on international markets.

To Dispose of Gas Masks

Chicago

• • • **WAA has for** disposal 2 million government surplus gas masks which cost the government nearly $5 million. The masks, of a noncombatant type used in civilian defense work, have been declared unsafe and unfit for use as gas masks or smoke masks, but WAA states the cannister, containing certain chemicals, could be removed easily and used in refrigerators as deodorizers. It has also been suggested that the mask carrier, a bag made of cotton duck, with strap to be worn over the shoulder, might be easily converted into a tool kit to carry pliers, screw driver and wrenches.

Wholesale purchasers will be required to execute written agreements not to sell the gas masks for the use for which they were originally intended.

Engineers of the Crown Cork and Seal Company specified Ampco Metal for the filler gear on Cem bottling machines—for longer life and lower maintenance costs. Segmented design makes maintenance easier, when required.
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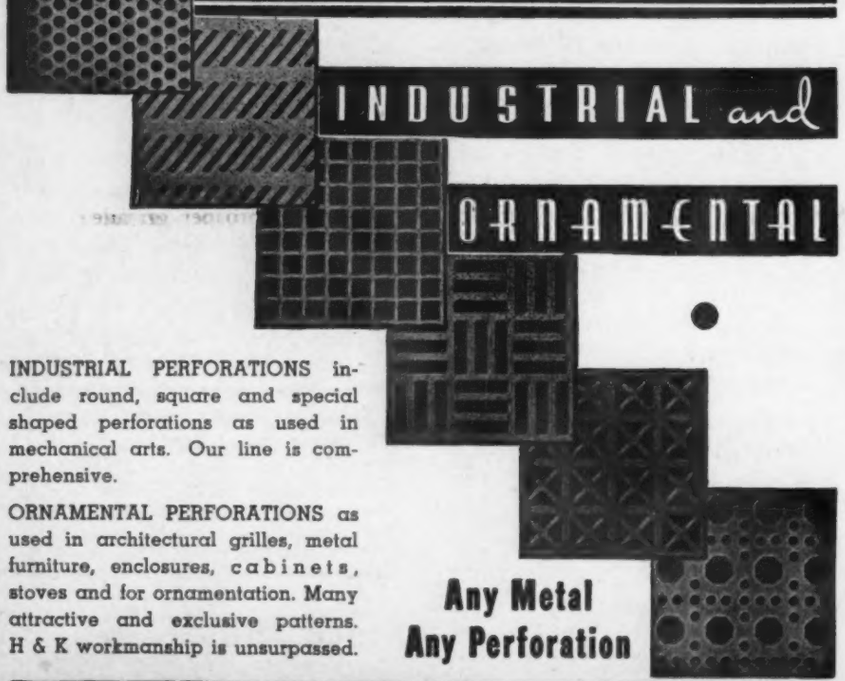

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International Acetylene Group Elects Officers

New York

• • • **Robert B. Swope,** president and general manager of the Southern Oxygen Co., Inc., Washington, D. C., was elected president of the International Acetylene Assn. at the annual business meeting held during this organization's recent 47th annual convention in Cincinnati. Mr. Swope has served as vice-president of the association since October 1944.

Robert B. Swope

J. J. Lincoln, Jr., director of sales services, Air Reduction Sales Co., New York, was elected vice-president, and H. F. Reinhard and Philip Kearny, both of New York, were reelected secretary and treasurer, respectively. New directors elected were Glenn O. Carter, The Linde Air Products Co., former president of the association; and L. R. Cartier, Independent Engineering Co., O'Fallon, Ill.

Robert B. Swope is a past president of the Independent Oxygen Manufacturers' Assn., and for many years has taken a leading part in the affairs of the industrial gas industry. He has served as chairman of the Washington section of the American Welding Society and has been a member of the executive committee of the Compressed Gas Manufacturers' Assn.

Construction Costs Gain

Washington

• • • **Construction costs** continued to rise in April, registering an increase of 0.6 pct from March and 22.3 pct from April 1946, according to the Dept. of Commerce Composite Index. April construction costs stood at 188.0 in the Commerce index (1939 = 100). The index for March was 186.9, for February 185.3 and for January 179.4.

Topics Discussed At MAPI Annual Meeting Cover Fiscal Policies

New York

• • • **The use of** federal taxes and expenditures to compensate for swings in the national economy and speculative investment as a factor in technological progress were topics discussed at the annual meeting of the Machinery and Allied Products Institute held here recently.

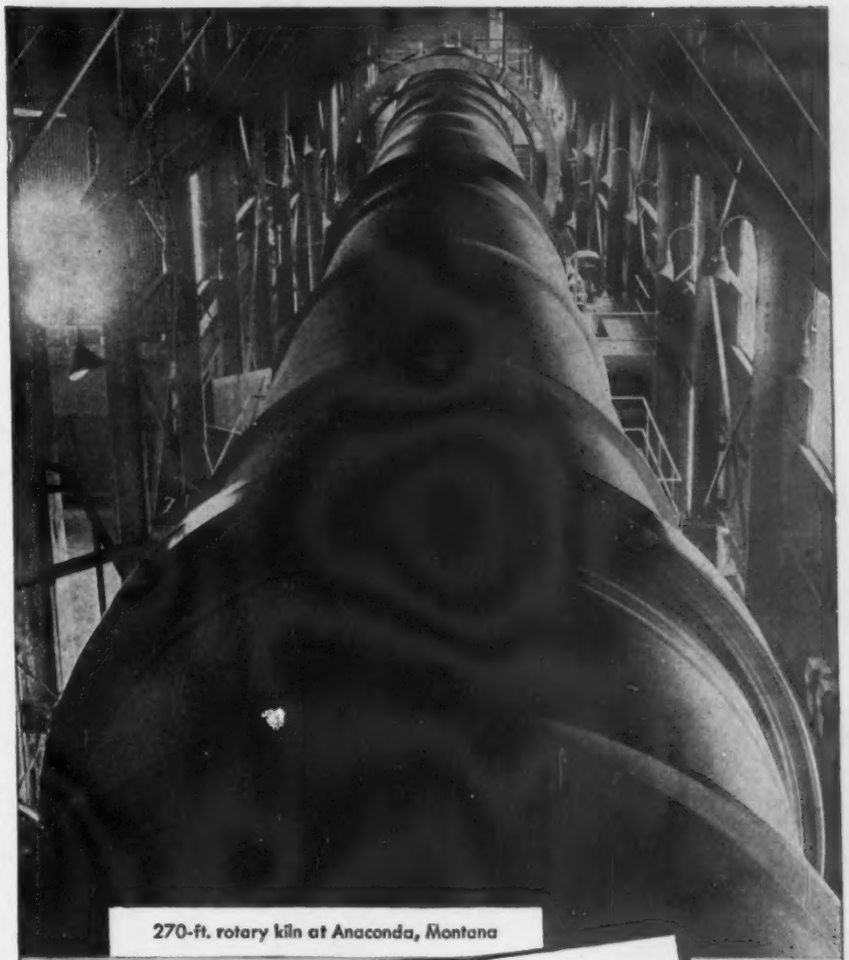
George Terborgh, economist and director of research for the MAPI, asserted, "I regard the use of compensatory fiscal policy as not only inevitable but desirable. I am aware of its dangers and of the fallability of political operation. I admit that it will be used haltingly and badly. I believe, nevertheless, that it is necessary in default of other means for stabilizing economic activity, and I know of no other device or group of devices that promises to be adequate.

"It must never be considered, however, a compensation for bad economic policies elsewhere and otherwise. It should be used rather as one weapon among many and without abatement of the effort to utilize other weapons to their full possibilities."

"The theory is very simple," he said. "If the private economy is not spending enough money, let the government spend more than it collects from the private economy. On the contrary, if the private sector is overexpansive and shows symptoms of an unhealthy boom, let the government go into reverse by collecting more taxes than it pays out in expenditure. In that way, as a theoretical proposition, it is possible to exercise a more or less continuously compensatory action and to have a balance-wheel effect on the entire economy."

Speaking on "Capital Goods Industries and Economic Stability," Mr. Terborgh said that capital goods industries themselves can do little to stabilize the economy because they represent only 5 to 10 pct of the total private investment in capital goods.

"The overwhelming bulk of such investment," he said, "is done by the customers of the capital goods industries, hence it is to them that



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we must look if selfstabilization is to be effective.

For all users of capital goods he recommended regularization of capital outlays both from the standpoint of public interest and self-interest.

"We must never," he said, "make mere stabilization the primary aim of economic policy. An economy can sink into stagnation and decay if it pursues stability and security above everything else.

"Our chief aim must be the preservation of the inherent dynamism and vitality of the system, without which stability is a poor thing indeed. I am bold enough to believe that we can have both in reasonable measure if we can learn to manipulate the instruments of policy at our disposal."

William J. Kelly, Chicago industrialist and president of the MAPI, declared at the meeting that fame and cash to keep must be held out as rewards for young men who risk everything on new ideas.

"As the problem of marketing becomes more complicated, the problems of attaining commercial success from new developments are greater. Likewise, the burden of risk-taking becomes too heavy to be borne by a single individual. Speculative investment provides the means of distributing the risk. We must go back to common sense and encourage speculation; we must agree too that unusual rewards must be held out for taking unusual risks."

He added, "Those who risk their money on new ideas with the prospect of eventual reward or the danger of total loss are in the company of such figures as Edison, Ford and Westinghouse. Only by the speculative use of a portion of the country's savings can society be provided with such developments as these men made available by their own speculations.

He said that technological advance is handicapped today by: Federal tax policies which do not permit free depreciation and a full offset for losses; trade union restrictions on the use of machinery in manufacturing; haphazard depreciation and replacement policies in many companies; and lack of understanding by the government, industry and the public of the relation of capital goods demand to the business cycle.

WAA Offers Portion Of Large Industrial Facilities in Nevada

Washington

• • • **WAA has placed** on the block the Gabbs, Nevada, portion of the surplus Basic Magnesium, Inc. project, largest industrial enterprise in the state. Offered for sale or lease, it includes not only the townsite but also the largest known magnesite deposits in North America and a complete plant for the reduction of these mineral deposits to magnesium oxide and concentrate.

The property, used during the war to supply feed for conversion to metallic magnesium at the Henderson, Nev., plant (about 250 miles distant), provides approximately 4990 acres of lode, placer and millsite claims. It cost the government about $8,500,000.

The town itself consists of 60 two and three-bedroom frame houses, a staff hotel with 21 single and four double rooms, a 19-unit apartment building, a five-classroom and auditorium school, a recreation building and a fire station.

Magnesium oxide obtained from the deposits provides a basic material for the manufacture of oxychloride cements, refractory brick, chemicals and allied magnesium compounds, insulation and other building products. These deposits are economically mined through openpit surface methods.

The main reduction plant consists of 11 steel frame buildings with corrugated iron exterior walls and 14 wood frame structures. Complete milling equipment, 1000 tons capacity, includes crushers, classifiers, agitators, conveyers, flotation, filtering and calcining units, Herreshoff furnaces, bucket elevators, ore feeders, and drills. Ample water is supplied from wells. Power is obtained from the Southern California Power Co.

Proposals to buy or lease the Gabbs property must be submitted in quadruplicate on WAA bid forms and must be received at the WAA Office of Real Property Disposal, 1182 Market St., San Francisco, by 10 a.m. (P.S.T.), July 1, 1947, where they will be publicly opened and read. Detailed information and particulars on bid procedure and credit arrangements may be obtained from the WAA San Francisco regional office.

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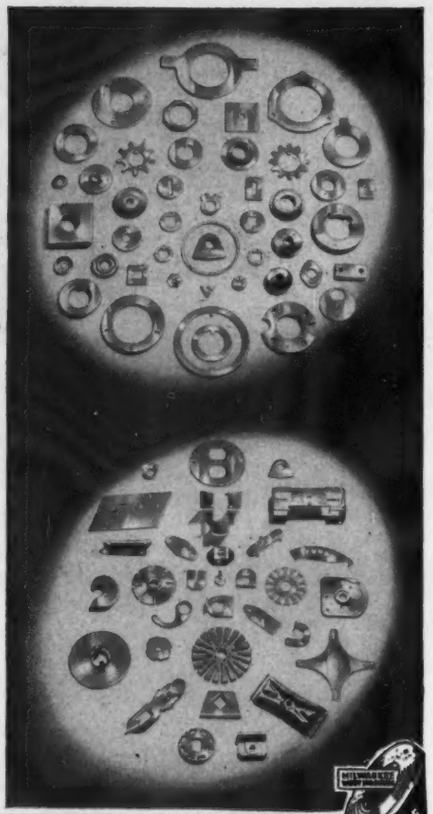

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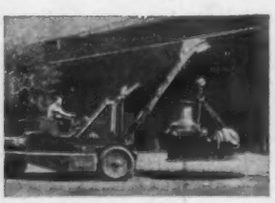
* *Names upon request.*



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Crucible Steel Finishes Spring Works as First Item in Expansion Plan

Pittsburgh

• • • **Crucible Steel Co.** of America recently completed the first large project in its $30 million expansion and improvement plan when the Spring Works at Pittsburgh went into full scale operation. The plant produces elliptical and coil springs, particularly for the railroad car industry. Machinery and equipment at the plant is as near automatic as possible and the bulk of it was designed and installed by the company.

Crucible moved its spring operations from the McKees Rocks plant to the new plant site. Acquired in 1945, the new plant is designed for a capacity of about 3000 tons of springs per month.

The company's entire expansion and modernization plan has been pegged at $30 million. Of this, $20 million will be spent at Midland, Pa., Works modernizing the semifinishing and finishing departments. A billet and bar mill, being installed by United Engineering & Foundry Co., will be in operation about October 1947. The alloy and stainless sheet and strip mill, to be built by United with electrical equipment from Westinghouse, will probably not be delivered before the end of 1948. A wire rod mill, additional coking facilities and general improvements of a lesser nature will complete the Midland Works expansion.

The La Belle plant of Crucible, the agricultural steel division, is being moved from Pittsburgh to Midland, and some $1 million is being spent in bringing about the change in location of the operation.

Park Works, at Pittsburgh, will have a new metallurgical laboratory and a new United Engineering & Foundry Co. bar mill. In addition, it is anticipated refinements will be made in final finishing operations of tool steels, stainless sheets and hack saw blades. The expenditure at this plant will total nearly $3 million.

W. H. Colvin, Jr., president of Crucible Steel Co. of America, indicated that appropriations cover nothing so far as increases in iron or steelmaking capacity. He stated that the capacity for making steel at Crucible is sufficient.

Weekly Gallup Polls

(CONTINED FROM PAGE 113)

put it another way, 12 pct of the total sample of employed people polled by the institute think there is a better than slight chance of losing their jobs within the next year.

How many millions of workers would this be if the percentages are translated into people?

The most recent report on the labor force was issued by the Census Bureau, covering the week of May 4-10. At that time there were 49,370,000 persons 14 years of age or over gainfully employed outside of agricultural industries, and the number of unemployed was approximately 2 million.

If the worst fears of the 12 pct mentioned above are realized, then the number of unemployed would be approximately trebled, assuming that none got other jobs.

The survey found wide differences in the degree of job optimism among various occupational groups. Of the professional and business people, which includes proprietors, only about one in ten thinks there is any chance of being out of work within a year.

Among manual workers, on the other hand, more than one in four expressed fear of unemployment in the coming year.

The results of the survey by occupational groups:

Any Chance of Unemployment?

	Yes Pct	No Pct	No Opin. Pct
Prof. & Bus.	11	83	6
White Collar	17	70	13
Manual Workers	28	51	21

In general, there is less optimism in cities of over 500,000 population than in smaller cities. Twenty-six pct of employed people polled in cities of half a million or more said there was a chance of unemployment within the next year, as compared to 20 pct in cities and towns under that size.

Greater job security is felt by those who went farthest in school. The results by educational level follow:

	Yes Pct	No Pct	No Opin. Pct
College	15	82	3
High School	18	68	14
Grade or No School	25	54	21

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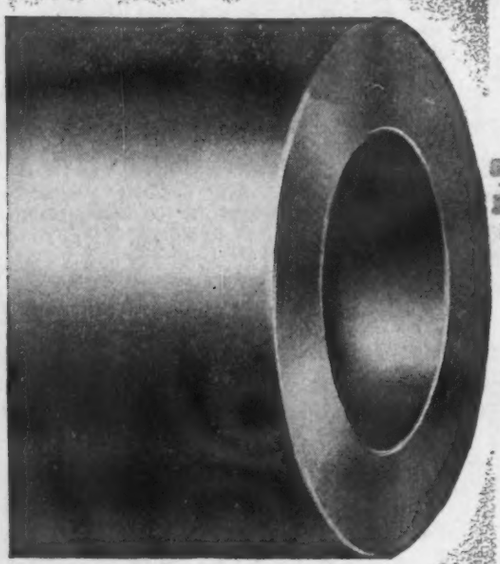

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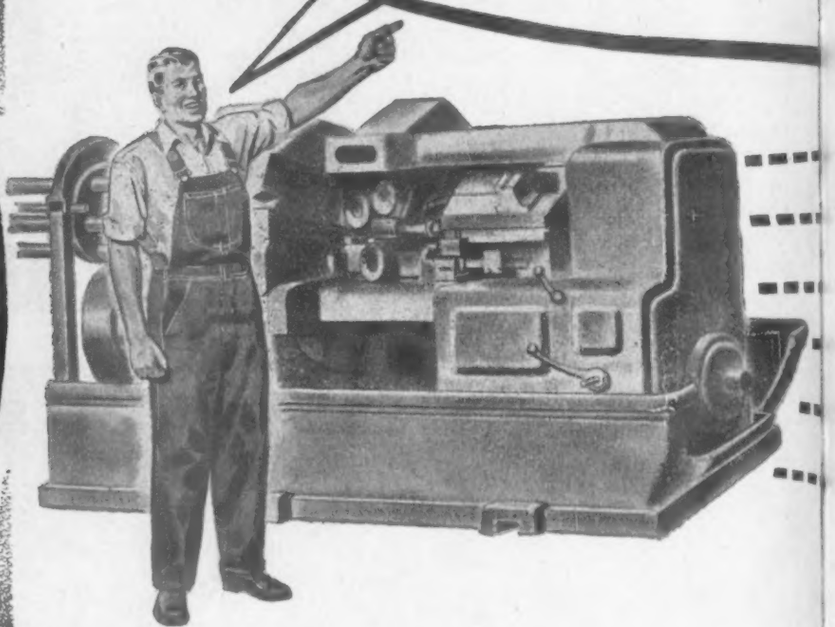

New, even startling, possibilities in screw-machine output of cylindrical and ring-shaped parts have been opened up through the use of Rockrite Tubing. In one case, two parts were finished simultaneously from Rockrite Tubing whereas only one could be made at a time from ordinary mechanical tubing. The output of parts per machine hour in other cases has been raised 60 per cent . . . even 100 per cent.

Rockrite Close Tolerance Tubing is more concentric than commercial tubing, has less variation in wall thickness, and is sized to closer outside- and inside-diameter tolerances. Lighter, faster, more uniform cuts are made possible, permitting practical use of forming tools with longer tool life, and other advantages.

In many instances slow boring can be eliminated as a bottle-neck to production. Fewer machining operations are required, and frequently stations can be released for added operations.